

Supplemental AOC Characterization Report AOC 1 and 2 Pre-1990 Area

Formosa Plastics Corporation - Texas

August 30, 2013

complex world

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Formosa Plastics Corporation, Texas

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August 29, 2013

Via e-mail and Certified Mail: 7011 0110 0000 1783 1087

Ms. Nancy Fagan **Project Coordinator** 6PD-O U. S. Environmental Protection Agency 1445 Ross Avenue, Suite 1200 Dallas, TX 75202-2733

Supplemental Areas of Concern Characterization Report RE:

RCRA Docket No. VI-001(h)-90-H

3008(h) Administrative Order on Consent

EPA I. D. No. TXT490011293 Solid Waste Registration No. 31945

Dear Ms. Fagan:

Please find attached the Supplemental Areas of Concern (AOC) Characterization Report. This report summarizes the data from the supplemental AOC characterization field work conducted in June 2013. This document is being submitted as required by Amendment No. 2 to the 3008(h) Order, TASK XI: Corrective Measures Implementation Program.

If you have any questions about this report, please contact Matt Brogger at (361) 987-7468 or by e-mail at mattb@ftpc.fpcusa.com.

Sincerely

R. P. Smith

Vice President/General Manager Formosa Plastics Corporation, Texas

Attachment





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Supplemental AOC Characterization Report AOC 1 and 2 Pre-1990 Area Formosa Plastics Corporation - Texas

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August 30, 2013

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LIST OF ACRONYMS

AOC Area of Concern

CAO Corrective Action Objective
CAP Corrective Action Plan
COC Chemical of Concern

COPC Chemical of Potential Concern

C-O-C Chain-of-Custody
C_{sat} Soil Saturation Limit
DQO Data Quality Objectives

EDC 1,2-Dichloroethane or Ethylene Dichloride EPA U.S. Environmental Protection Agency

FM Farm to Market Road

FPC-TX Formosa Plastics Corporation, Texas

FSP Field Sampling Plan
HASP Health and Safety Plan
NAPL Non-Aqueous Phase Liquid

NFA No Further Action PCE Tetrachloroethene

PCL Protective Concentration Level

PVC Polyvinyl Chloride

QAPP Quality Assurance Project Plan
QA/QC Quality Assurance/Quality Control

RCRA Resource Conservation and Recovery Act

RFA RCRA Facility Assessment RFI RCRA Facility Investigation RMP Risk Management Plan

SWMU Solid Waste Management Unit

TCE Trichloroethene

TCEQ Texas Commission on Environmental Quality

TDS Total Dissolved Solids

TRRP Texas Risk Reduction Program

VCM Vinyl Chloride Monomer
VOC Volatile Organic Compounds
WWTP Waste Water Treatment Plant

1,1-DCA 1,1-dichloroethane 1,1-DCE 1,1-dichloroethene

1.0 INTRODUCTION

In accordance with the U.S. Environmental Protection Agency (EPA) Administrative Order on Consent with Corrective Action Plan (CAP) dated February 27, 1991, as amended on June 12, 2012 (Amendment No. 2) (EPA Docket No. VI-001(h)-90-H; EPA I.D. No. TXT490011293), Formosa Plastics Corporation, Texas (FPC-TX) has undertaken measures to characterize and remediate soil and groundwater affected by volatile organic compounds (VOCs) at the Point Comfort facility.

As documented in the Final Risk Management Plan (RMP) (Tetra Tech, 2010), impacted soil and groundwater associated with Solid Waste Management Units (SWMUs) have been segregated into two distinct Areas of Concern (AOC) at the FPC-TX facility: AOC 1 – the former Waste Water Treatment Plant (WWTP) area located in the eastern portion of the pre-1990 area; and AOC 2 – the Vinyl Chloride Monomer (VCM) Process area located in the central portion of the pre-1990 area. Amendment No. 2 to the 3008(h) Administrative Order includes requirements for additional characterization of the two pre-1990 area AOCs. The Final AOC Characterization Work Plan (Tetra Tech, 2012) was submitted to EPA on May 4, 2012 and approved by EPA on June 12, 2012. The work plan was implemented and the AOC Characterization Report (PBW, 2012) was submitted to EPA on November 9, 2012.

Corrective Action Objectives (CAOs) were presented in EPA's Performance Based Remedy Decision document (EPA, 2009), finalized in the Response to Comments/Final Decision Document (EPA, 2010) and discussed in detail in the RMP and the Final AOC Characterization Work Plan. The Final AOC Characterization Work Plan developed Data Quality Objectives (DQOs) (EPA, 2000) for the FPC-TX site to support the Corrective Action Objectives. Based on the data provided in the AOC Characterization Report, and review of additional quarterly monitoring data collected in 2012, it was determined that additional characterization of the two media-based AOCs was required to meet the data quality objectives developed in the Final AOC Characterization Work Plan. Specifically, additional characterization of the extent of impacted groundwater was required to support Corrective Action Objective (CAO) 1 and the groundwater portion of CAO 2.

A Supplemental AOC Characterization Work Plan (the "Supplemental Work Plan") (Tetra Tech, 2013) was prepared that described further characterization activities for both AOCs. The

Supplemental Work Plan was designed as an addendum to the Final AOC Characterization Work Plan and as such relies to a large extent on the Final AOC Characterization Work Plan as well as the AOC Characterization Report. EPA provided comments on the Supplemental Work Plan via e-mail dated January 30, 2013. In addition to the new wells planned in support of CAO 1 and 2, EPA required additional monitoring wells located in the vicinity of existing monitoring wells P-9 and P-38. These additional wells are not required based on the DQOs previously developed; however, additional characterization of the impacted groundwater present at P-9 and P-38 is required to satisfy the requirements of the Affected Property Assessment under the Texas Risk Reduction Program (TRRP).

Following EPA review of a draft and incorporation of EPA's comments, the Supplemental Work Plan was submitted to EPA on February 28, 2013 and approved by EPA on via letter dated March 28, 2013. The investigation was conducted in June 2013 in accordance with the Supplemental AOC Characterization Work Plan. This report presents the findings of the Supplemental AOC Characterization at the FPC-TX facility.

2.0 INVESTIGATION ACTIVITIES

Investigation activities were conducted per the approved Supplemental Work Plan and are described in detail in the Supplemental Work Plan. The following activities were conducted during the investigation.

- Installation of seventeen monitoring wells.
- Collection and analysis of groundwater samples from the new monitoring wells.

All groundwater samples collected during the investigation were analyzed for VOCs via EPA Method SW 8260.

Each activity is described in greater detail in the following sections. All activities were conducted in accordance with the Supplemental Work Plan, except where noted. Boring logs and well construction diagrams are included in Appendix A to this report. Survey data for the new wells are included in Appendix B. Groundwater sampling field notes are in Appendix C. The laboratory analytical report (ALS Environmental) is provided in Appendix D. The Data Usability report is in Appendix E.

2.1 Monitoring Well Installation

The new monitoring wells were installed using a sonic drilling rig. Monitoring well construction adhered to federal, state and local regulations. With the exception of monitoring well B-1, monitoring wells were constructed of 2-inch diameter, flush-joint threaded stainless steel pipe. Monitoring well B-1 may be converted to a recovery well; thus, it was constructed of 6-inch diameter, flush-joint threaded stainless steel pipe.

For the Zone A wells, first, the sonic rig was located at the surveyed and permitted boring location. Each boring location was checked with a probe rod to four feet bgs in order to locate any underground obstructions or buried piping. Once the location was cleared, a ten-foot long by four-inch diameter core barrel was driven into the ground. This initial run reached a depth of seven feet, as the drilling rig working platform was approximately three feet above ground. This core barrel was removed, and the zero to seven foot sample was extruded from the core barrel.

The override six-inch casing was then driven to the seven foot depth, and the four-inch core barrel was advanced five to ten feet. The core barrel was then retrieved, and the soil core was extruded from the barrel. This process was then repeated one additional time until Zone A was properly identified, at which time the well was set in place. Once the two-inch stainless steel well was constructed, the filter pack placed, and the bentonite chip seal poured, the six-inch override casing was pulled from the borehole. The bentonite seal was hydrated using potable water from the Site.

When drilling boreholes through more than one groundwater bearing unit (i.e. the Zone B and Zone C wells), necessary measures were taken to prevent cross-connection and the potential for cross-contamination between groundwater bearing units. For the Zone B and Zone C wells, the sonic rig was again positioned at the surveyed and permitted boring location, and the location was again probed for underground obstructions. The initial casing run diameter depended on whether the well would ultimately be a Zone B and Zone C well. For the Zone B wells, the initial override casing was a seven-inch. For the Zone C wells, the initial override casing was an eight-inch. In each case, as the four-inch core barrel sampled the soils, the larger casing would override the core barrel, to the sampled depth, and then the core barrel was removed from the borehole and the sample was extruded. The outer, larger casing at the surface would serve to case off the upper A zone, at which time a smaller diameter casing would be advanced into Zone B. If the boring was to become a Zone C well, a third casing would then be advanced after Zone B had been cased off. This creates a telescoping casing downward and effectively serves to eliminate cross-contamination between the groundwater bearing units. At monitoring well B-1, the process was identical to the above description, however, the casing diameters were larger, to accommodate the six-inch diameter stainless steel well screen and riser. Casings at B-1 were a 12-inch, then a ten-inch and then an eightinch. B-1 was ultimately set in the eight-inch casing.

Once the total depth was determined, the B and C zone wells (with the exception of B-1) were also constructed of two-inch flush-joint stainless steel screen and riser. Occasionally, the borehole was overdrilled, and bentonite chips were used to backfill the borehole to the desired bottom of screen depth. When the screen and riser were set, the filter pack was placed. The annular space around the screened interval was packed with 20/40 mesh washed silica sand to a depth of 2 to 3 feet above the top of the screened interval. A 2- to 5-foot-thick bentonite-pellet seal was poured above the sand filter pack to seal the borehole. The Zone B and Zone C wells

required grouting, to ensure the well's integrity. Above the bentonite seal, a cement-bentonite grout was placed to seal the annular space to within one to three feet below the ground surface. Grouting of the B and Zone C monitoring wells was conducted with a tremie pipe set at the base of the borehole and with the eight-inch or seven-inch surface casings still in the ground. The seven-inch and eight-inch casings were removed as necessary as the grout was pumped from the bottom of the boring to the surface. The grout was allowed to cure for a minimum of 24 hours and then a surface installation was installed (concrete pad, protective steel casing, bollards). A locking, water-tight well plug was placed inside the top of the stainless steel well casing. Following completion, all new wells were developed using a submersible pump.

The following bullets briefly summarize the location of and rationale for each of the new monitoring wells installed. Figure 1 includes the location of all of the existing monitoring and recovery wells and the new monitoring wells.

AOC 1 WWTP Area Groundwater

- Zone A monitoring well P-68 is located to the east of P-18 and to the east of TPZ-AOC1 A4 to support CAO 1 and attempt to bound the extent of the plume to the east of P-18.
- Zone B monitoring well B-1 is located in the vicinity of P-56/P-57/RS-6 to support CAO 1 and CAO 2. This well essentially replaces temporary piezometer TPZ-AOC1-B1 with a permanent well.
- Zone B monitoring well B-2 is located near monitoring well SWM-A1 (P-58) to support CAO 1 and CAO 2 and is intended to adequately characterize the possible extent of the groundwater impacts previously identified at temporary piezometer TPZ-AOC1-B1.
- Zone B monitoring well B-3 is located east of SWMU 7 and east of D-33/D-43 to support
 CAO 1 and to replace damaged existing well P-16.
- Zone B monitoring well B-4 is located due east of P-56 in the former TxDOT picnic area (property recently acquired by FPC-TX) to support CAO 1 and 2 and is intended to adequately characterize the possible extent of the groundwater impacts previously identified at temporary piezometer TPZ-AOC1-B1.
- O Zone C monitoring well D-45 is located in the vicinity of P-56/P-57/RS-6 to monitor for potential vertical contaminant migration to support CAO 1 and CAO 2 and is intended to provide vertical characterization of the groundwater impacts previously identified at temporary piezometer TPZ-AOC1-B1.

o Zone C monitoring well D-46 is located to the west of SWMU 7 to monitor for potential vertical contaminant migration from Zone B wells D-33/D-43 and potential lateral migration from Zone C wells D-34/D-44 to support CAO 1.

AOC 2 VCM Area Groundwater

- Zone A monitoring wells P-61 and P-62 are located in the vicinity of SWM-A3 (P-60) to support CAO 1 and are intended to confirm that the COCs previously detected at P-60 are limited in extent.
- Zone A monitoring well P-66 is located to the west of P-50 to evaluate possible transport pathways from the VCM area plume toward the east in support of CAO 1.
- O Zone B monitoring well B-5 was planned for the vicinity of P-50 in support of CAO 1 to confirm if a Zone B water bearing unit is present at this location: Zone B was not encountered when attempting to set this well, thus B-5 was not installed.
- Zone B monitoring well B-6 is located on the former Brookings property in support of CAO 1 to confirm that Zone B impacts have not migrated onto the former Brookings property.
- o Zone B monitoring wells B-8 and B-7 are located to the in the vicinity of TPZ-AOC2-B1 and TPZ-AOC2-B2, respectively, to support CAO 1 and 2. These permanent wells essentially replace the previously installed temporary piezometers.
- O Zone C monitoring well D-47 is located approximately 1500 feet southeast of the existing VCM area plume at the southeastern perimeter of the active facility in general support of CAO 1 as well as potentially providing vertical control for the outlier well P-9.

Outlier Wells P-9 and P-38

- Zone A monitoring well P-63 is located approximately 400 feet west (downgradient) of P-38 to provide adequate characterization in accordance with TRRP.
- Zone A monitoring wells P-64 and P-65 are located to the southwest of P-9 to provide additional characterization in accordance with TRRP.

2.2 Groundwater Sampling

Groundwater samples were collected via low flow sampling techniques using a peristaltic pump and dedicated polyethylene and silicone tubing. Water levels were measured at each new well prior to sampling and during well purging. Some Zone A wells were slow to recharge and

required additional development prior to sampling. The new wells were sampled June 27 and 28, 2013. Table 1 summarizes the groundwater parameters monitored during well purging and sampling. Groundwater sampling records and field notes are in Appendix C.

All samples were immediately placed into the appropriate containers supplied by the laboratory and immediately placed on ice in ice chests. Samples were kept on ice until shipment to the laboratory. Ice chests were packed with ice and sealed for shipment. Samples were maintained under standard chain-of-custody procedures from the time of collection until receipt by the laboratory.

2.3 Well Survey

New monitoring wells were surveyed on July 17, 2013 by Ganem & Kelly Surveying, Inc. Well survey information is located in Appendix B.

2.4 Deviations from Work Plan

The following deviations from the Work Plan were made during the course of the investigation:

- Due to the inability of the drilling rig and support box truck to set up exactly at the surveyed location for B-1, the boring location was offset 9 feet to the north and three feet to the west of the location described in the Supplemental AOC Work Plan.
- 2) Due to the relocation of B-1, the boring location for D-45 offset 9 feet to the north of the location described in the Supplemental AOC Work Plan.
- 3) A well was not installed at location B-5 since Zone B was not observed in the subsurface during drilling and the hole was dry.
- 4) Due to the presence of underground utilities, the location for well P-63 was relocated to the opposite side of the road.
- 5) Due to the presence of underground utilities, the location for well B-4 was relocated to the opposite side of State Highway 35, in the former TxDOT picnic area.
- 6) Due to heavy vegetation on the former Brookings property, the location for P-62 was relocated approximately 200' to the southwest.

3.0 INVESTIGATION RESULTS

3.1 Geology and Hydrogeology

Section 3.1 of the 2012 AOC Characterization Report provided a detailed description of the subsurface geology and stratigraphy at the facility as well as detailed descriptions of the Zone A, B and C water bearing units. The materials and conditions encountered during the Supplemental AOC Characterization investigation are consistent with the information provided in previous reports. Of specific note is the absence of Zone B in the vicinity of existing nested monitoring wells P-50/D-21/3D-3. When considered in conjunction with the lack of Zone B at previous boring location SMW-1BX on the former Brookings Property, this further substantiates the discontinuous nature of Zone B. Updated cross-sections including the new monitoring wells will be prepared and included in the Revised Site-wide Risk Management Plan.

During the initial well sampling event in June, water levels were measured at only the new monitoring wells. During the 3rd Quarter 2013 Interim Measures Groundwater Monitoring activities, water levels were measured at all wells located in the pre-1990 area on August 8 and 9, 2013, including the new monitoring wells. Figures 2, 3, and 4 present potentiometric surface maps for Zone A, B, and C groundwater units, respectively.

3.2 Groundwater Analytical Results

Groundwater samples were collected from 17 new monitoring wells. The analytical results for groundwater samples are summarized on Table 2. For brevity, Table 2 only includes parameters detected above detection limit. The analytical results associated with the new monitoring wells for Zone A, B, and C are presented on Figures 5, 6 and 7, respectively. These figures only present the data for chemicals of concern with concentrations greater that the Tier 1 groundwater ingestion PCLs. These figures also show the PCLE zone from the 1st Quarter 2013 Interim Measures Groundwater Monitoring event. FPC-TX samples all the wells during the 1st quarter of each year, thus this data set provides the most temporally cohesive picture of the groundwater impacts each year.

3.2.1 AOC 1 WWTP Area Groundwater

Zone A monitoring well P-68: P-68 was installed approximately 250 ft east of the location of TPZ-AOC1-A4, and 350 feet to the east of P-18. The groundwater sample collected at P-68 contained TCE in excess of PCLs. The EDC concentration reported for the sample from P-68 was equal to the PCL. No contaminants were detected in previously sampled piezometer TPZ-AOC1-A5, thus the groundwater plume in this area appears to be migrating directly to the east. The potentiometric surface at P-68 appears to indicate that it is slightly upgradient from P-18. Additional groundwater sampling points may be required in this area to adequately characterize the extent of impacted Zone A groundwater in this area.

Zone B monitoring well B-1: B-1 was installed in the vicinity of P-56/P-57/RS-6 primarily to replace temporary piezometer TPZ-AOC1-B1, as well as provide a potential Zone B recovery well given the elevated concentrations previously reported at TPZ-AOC1-B1. Monitoring well B-1 was located approximately 100 feet east of TPZ-AOC1-B1 in order to locate it relatively close to the existing groundwater recovery infrastructure at the P-56/P-57/RS-6 well grouping. The concentration of several COCs exceeded PCLs in the groundwater sample collected from monitoring well B-1; however the concentration of all COCs are significantly less than those previously reported at TPZ-AOC1-B1. None of the reported concentrations exceeded 1% of the solubility limit.

Zone B monitoring wells B-2, B-3, and B-4: Monitoring well B-2 was installed on the former Brookings property to the south-southeast of monitoring well B-1, near new monitoring well P-58 (formerly SMW-A1), to evaluate the possible lateral extent of the impacted Zone B groundwater. Monitoring well B-3 was installed on the eastern side of the former sludge drying beds (SWMU 7) to evaluate the potential lateral extent of impacted groundwater present at existing monitoring wells D-32/D-33, and to replace damaged monitoring well P-16. Monitoring well B-4 was installed in the former TxDOT picnic area (property recently acquired by FPC-TX) due east of the P-56/P-57/RS-6 well grouping to evaluate the possible lateral extent of the impacted Zone B groundwater. There were no VOC concentrations reported above the PCLs for the groundwater samples collected at B-2, B-3, and B-4.

Zone C monitoring well D-45: D-45 was installed adjacent to new Zone B monitoring well B-1 to monitor for potential vertical contaminant migration associated with TPZ-AOC1-B1. The

concentration of EDC exceeded the PCL in the groundwater sample collected from monitoring well D-45. All other VOC concentrations were reported as less than the detection limit, with the exception of chloroform which was reported at a concentration two orders-of-magnitude below the PCL. The presence of EDC in the sample from D-45 confirms that vertical migration has occurred from Zone B to Zone C in this area. The EDC concentration at D-45 was higher than the EDC concentration reported in the sample from monitoring well B-1. The potentiometric surface of Zone C is extremely flat; however, it does appear that monitoring well D-45 is generally downgradient of the Surge and Emergency Basins.

Zone C monitoring well D-46: D-46 was installed to the east of existing wells D-34/D-44 to provide lateral control of this area and to monitor for potential vertical contaminant migration from Zone B wells D-33/D-43. This well was located in the general vicinity of existing Zone B wells D-33 and D-43. All VOC concentrations in the groundwater sample collected from monitoring well D-46 were reported as less than the detection limit with the exception of chloroform, which was reported at a concentration two orders-of-magnitude below the PCL.

3.2.2 AOC 2 VCM Area Groundwater

Zone A monitoring wells P-61 and P-62: P-61 and P-62 were installed on the former Brookings property to the east and south of P-60 (formerly SWM-A3) to attempt to characterize the potential lateral extent of impacted Zone A groundwater in this area. There were no VOC concentrations reported above the PCLs for the groundwater samples collected at monitoring wells P-61 and P-62.

Zone A monitoring well P-66: P-66 was installed along the property boundary between P-50 and P-3 to further evaluate the extent of impacted Zone A groundwater in this area and evaluate possible transport pathways from the VCM area plume in support of CAO 1. EDC was detected in monitoring wells P-50 and P-51 during the 4th quarter 2012 and the 1st and 2nd quarter 2013 groundwater monitoring events, albeit at concentrations less than PCLs. concentrations in the groundwater sample collected from monitoring well P-66 were reported as less than the detection limit with the exception of chloroform, which was reported at a concentration approximately one order-of-magnitude below the PCL.

Zone B proposed monitoring well B-5: B-5 was intended to be installed in the vicinity of P-50 in support of CAO 1; however, Zone B was not found in the subsurface at the B-5 location, thus no well was installed, and no groundwater sample collected at this location. The absence of Zone B in this area confirms that existing monitoring well D-21 is a C Zone well. Cross-sections will be modified in the next update of the RMP to reflect the better understanding of the B and C Zone in this area.

Zone B monitoring well B-6: B-6 was installed on the former Brookings property in support of CAO 1 and was intended to serve several purposes including: evaluating the potential extent of the Zone B discontinuity observed when previously attempting to install a Zone B well on the former Brookings property south of RS-4/RS-5 near monitoring P-60; providing an off-site Zone-B monitoring point approximately mid-way between the VCM and former WWTP groundwater areas; and obtaining valuable additional geological and potentiometric data from this location. Zone B was encountered at this location, thus the discontinuity observed at previous location SMW-B1X and proposed location B-5 does not extend to this area. There were no VOC concentrations reported above the PCLs for the groundwater sample collected at monitoring well B-6. EDC was reported at a concentration of 0.003 mg/l, slightly below the PCL of 0.005 mg/l. The potentiometric surface for monitoring well B-6 appears to be generally downgradient of the facility. Future sampling of this well will confirm if contamination is present in Zone B on the former Brookings property.

Zone B monitoring wells B-8 and B-7: Monitoring wells B-7 and B-8 were installed to the south of TPZ-AOC2-B1 and southeast of TPZ-AOC2-B2, respectively, to support CAO 1 and 2 and replace those temporary piezometers. COC concentrations in excess of PCLs were previously reported for the groundwater samples collected at both temporary piezometer locations. The new wells provide key monitoring point locations as well as providing potentiometric surface data so that Zone B hydrogeologic characteristics will be better understood.

The concentrations reported for the sample collected at monitoring well B-7 exceed the PCLs for several COCs, and are similar, but slightly less than those reported for the sample previously obtained at TPZ-AOC2-B2. Temporary well TPZ-AOC2-B2 was screened at a depth of 39 to 44 feet below grade. Monitoring well B-7 was screened at a depth of 30 to 40 feet below grade. Monitoring well B-7 is located approximately 67 feet to the southeast of TPZ-AOC2-B2. Based on the potentiometric surface, monitoring well B-7 appears to be downgradient of the VCM area.

Monitoring well B-8 is located approximately 128 feet south of TPZ-AOC2-B1. TPZ-AOC2-B1 was screened at a depth of 37 to 42 feet. New monitoring well B-8 was screened at a depth of 33 to 43 feet. The concentrations reported for the sample previously obtained at TPZ-AOC2-B1 were very high with several COC concentrations approaching 1% of the solubility limit. There were no VOC concentrations reported above the PCLs for the groundwater sample collected at monitoring well B-8. It is possible that Zone B is not continuous between B-8 and TPZ-AOC2-B1. The potentiometric surface at B-8 indicates it is upgradient from both existing well P-12 and new monitoring well B-7. Based on the results reported for the sample from monitoring well B-8, the southern extent of the Zone B contaminant plume appears to be bounded. Further, monitoring well B-8 is located in the general vicinity of Zone A wells P-3 and RS-4/RS-5, and appears to indicate there is no vertical migration of contaminants from Zone A in this area.

Zone C monitoring well D-47: D-47 was installed approximately 1350 feet southeast (downgradient) of existing recovery well RD-1 at the southeastern perimeter of the active facility in general support of CAO 1 as well as potentially providing vertical control for the outlier well P-9. There were no VOC concentrations reported above the PCLs for the groundwater sample collected at monitoring well D-47.

3.2.3 Outlier Wells P-9 and P-38

Zone A monitoring well P-63: P-63 was installed downgradient of P-38 to provide additional characterization of this area in accordance with TRRP. There were no VOC concentrations reported above the detection limit for the groundwater sample collected at monitoring well P-63.

Zone A monitoring wells P-64 and P-65: P-64 and P-65 were installed to the southwest of P-9 to provide additional characterization of this area in accordance with TRRP as well as provide additional Zone A monitoring well located along the property boundary north of the Alcoa mud lakes. There were no VOC concentrations reported above the PCLs for the groundwater samples collected at monitoring wells P-63 and P-65. The potentiometric surface at monitoring wells P-64 and P-65 are of interest (Figure 2). Previously the elevated potentiometric surface at P-9 was interpreted to possibly be associated with mounding caused by the mud lakes. Based on the most recent data, neither P-65 (which is actually closer to the mud lakes) nor P-64

indicate elevated water levels. The high elevation at monitoring well P-9 may be a localized high area, or the high point associated with a natural groundwater divide.

3.3 Data Usability

A QA/QC data validation review was performed to evaluate the level of accuracy, precision, and completeness of the laboratory data. Table 3 presents VOC analytical results for field duplicates and VOC analytical results for trip blanks and field blanks are presented in Table 4. The Data Usability Summary (DUS) is provided in Appendix E. Results were evaluated based on TRRP criteria and all reported results were determined to be valid and usable for the purposes intended by this report. The reviewer qualified some results as potentially contaminated (U), and/or not accredited (X7). The qualifications affect samples collected at eight wells (P-62, P-63, P-65, P-66, P-68, B-4, B-8, and D-47) for acetone due to field blank contamination. Data qualifications are presented in Table 2 and included in the DUS in Appendix E.

4.0 SUMMARY AND CONCLUSIONS

The Zone A plume observed at well P-18 and TPZ-AOC1-A4 extends to the east at least as far as the location of new monitoring well P-68. No contaminants were detected in previously sampled piezometer TPZ-AOC1-A5 located to the south of P-68, thus the groundwater plume in this area appears to be migrating directly to the east. Additional monitoring points may be required to adequately characterize Zone A in this area.

Concentrations of EDC and other COCs in Zone B monitoring well B-1 exceeded PCLs, but were lower than anticipated given the elevated concentrations previously reported in TPZ-AOC1-B1, located nearby. This, coupled with the presence of EDC above the PCL in the groundwater sample collected at Zone C well D-45, may indicate that Zone B in this area is more likely to represent a vertical conduit between Zone A and Zone C as opposed to extensive lateral migration in Zone B.

There were no VOC concentrations reported above the detection limit for the groundwater samples collected at monitoring wells B-2, B-3, B-4, and B-6. The impacted Zone B groundwater identified at TPZ-AOC1-B1 and new monitoring well B-1 appears to be adequately characterized. However, it was noted that the concentration of EDC reported for the sample collected at monitoring well B-6 on the former Brookings Property was only slightly below the PCL. Future sampling of the well should be closely reviewed.

The concentration of EDC exceeded the PCL in the groundwater sample collected from Zone C monitoring well D-45. Additional monitoring points may be required to adequately characterize Zone C in this area.

All VOC concentrations in the groundwater sample collected from monitoring well D-46 were reported as less than PCLs. Zone C appears to be adequately characterized in this area.

All VOC concentrations in the groundwater samples collected from monitoring wells P-61 and P-62 were reported as less than PCLs. The previously reported detections at monitoring well P-60 appear to be limited and Zone A in this area is now adequately characterized.

VOC concentrations reported at monitoring well P-66 were less than PCLs. Based on this data, it appears that the Zone A impacted groundwater in the VCM area is not migrating laterally to the east and the potential source of the low level VOCs (less than PCLs) reported at monitoring well P-50 is not clear.

Zone B monitoring well B-8 was installed approximately 130 feet south of temporary piezometer TPZ-AOC2-B1. All VOC concentrations in the groundwater samples collected from monitoring well B-8 were reported as less than PCLs, thus the lateral extent of the Zone B VCM plume appears to be adequately characterized in this area.

VOC concentrations reported for the sample collected at new monitoring well B-7 exceeded PCLs and were similar to those previously reported for TPZ-AOC2-B-2. Zone B was not present at proposed location B-5 located to the east of B-7, or at previously drilled location SMW-B-1X located to the south of B-7. It is unclear if Zone B is continuous between monitoring wells B-8 and B-6 located to the southeast on the former Brookings Property.

All VOC concentrations in the groundwater samples collected from Zone A monitoring wells P-63, P-64, and P-65, and Zone C monitoring well D-47 were reported as less than PCLs. The lateral extent of the Zone A groundwater impacts identified at monitoring wells P-9 and P-38 appear to be adequately characterized. Zone C does not appear to be impacted in the area southwest of the VCM area.

4.1 Possible Additional Investigation

As described above, additional investigation may be required to provide further characterization of the following areas:

- Zone A to the east of monitoring well P-68 in the former WWTP Area.
- Zone B to the southeast of monitoring well B-7 east of the VCM Area.
- Zone C to the south and east of monitoring well D-45 in the former WWTP Area.

5.0 REFERENCES

- PBW, 2012. Pastor, Behling, & Wheeler, LLC, AOC Characterization Report. November 9.
- Tetra Tech, 2010. Tetra Tech, Final Risk Management Plan. April 30.
- Tetra Tech, 2012a. Tetra Tech, Areas of Concern, Characterization Work Plan. May 4.
- Tetra Tech, 2013. Tetra Tech, Supplemental AOC Characterization Work Plan. February 28.
- Tetra Tech, 2013. Tetra Tech, *Interim Measures Groundwater Monitoring Report*, 1st Quarter 2013. June 27.
- U.S.EPA, 2000. U.S. Environmental Protection Agency, *Data Quality Objectives Process for Hazardous Waste Site Investigations* (QA/G-4HW)(EPA/600/R-00/007)
- U.S.EPA, 2009. U.S. Environmental Protection Agency, *Performance-Base Remedy Decision Document, RCRA Corrective Action for the 1991 EPA Administrative Order, Formosa Plastics Corporation.* October 9.
- U.S.EPA, 2010. U.S. Environmental Protection Agency, Response to Comments/Final Decision Document, Docket No. RCRA-VI-001(h)-90-H. Signed March 11.

TABLES

GROUNDWATER FIELD PARAMETER DATA SUPPLEMENTAL AOC CHARACTERIZATION FORMOSA PLASTICS CORPORATION, TEXAS

TABLE 1

MONITORING WELL ID	рН	CONDUCTIVITY (mS/cm)	TEMPERATURE (°C)	
P-61	6.98	3170	120.0	26.5
P-62	6.86	1720	0.7	25.4
P-63	6.75	753	112.0	27.4
P-64	7.07	1980	26.8	26.9
P-65	6.15	3630	69.0	25.9
P-66	6.35	13800	119.0	29.0
P-68	6.71	6950	50.5	26.4
B-1	6.61	9060	3.1	30.2
B-2	6.48	7880	75.6	24.1
B-3	6.57	7610	20.7	25.9
B-4	6.84	4800	54.9	23.7
B-6	6.71	5520	42.1	26.0
B-7	6.42	11000	19.7	26.3
B-8	6.14	14400	26.5	24.4
D-45	6.57	5690	38.3	26.4
D-46	6.88	5350	9.7	24.6
D-47	10.56	638	15.5	25.6

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE RESULTS SUPPLEMENTAL AOC CHARACTERIZATION FORMOSA PLASTICS CORPORATION, TEXAS

		SCREENING CRITERIA				S48546666066908	sesto sistema tr	Oncoden Menumenta		· · · · · · · · · · · · · · · · · · ·		<u> </u>					
	MCL (mg/L)	TRRP PCL GWing	1% Solubility	P-61	Manny.	P-62		P-63		Monitoring P-64	70.00 12.00	**************************************	ávanava.		i di		(Minney)
Volatile Organic Compounds (VOCs)		(mg/L)	(mg/L)	mg/L	Flag	mg/L	Flag	mg/L	Flag	mg/L	Flag	P-6! mg/L	Flac	P-6i mg/L	Flag	P-6	(c. amount)
1,1,2-Trichloroethane	0.005	0.005	44,2	-0.00000			,				i lessings.	2000 C.	e Gastin		11.29	111g/L	Fla
1,1-Dichloroethane	15	15	55	<0.00030	U	<0.00030	U	<0.00030	U	<0.00030	Ų	<0.00030	Ü	<0.00030	Ū	0.0013	Τ-
1,1-Dichloroethene	0.007	0.007	24	<0.00030	U	<0.00030	U	<0.00030	U	<0.00030	Ū	<0.00030	U	<0.00030	T U	0.032	+ -
1,2-Dichloroethane	0.005	0.005	87	<0.00030		<0.00050	Į Ų.	<0.00050	U	<0.00050	U	<0.00050	Ü	<0.00050	U	<0.00050	- 11
1,3-Dichlorobenzene Acetone		2.2	1.1	<0.00030		<0.00030		<0.00030	U	0.00061	J	<0.00030	Ü	<0.00030	U	0.0050	1
Benzene	-	66	6000	<0.0010	, ii	<0.00030 0.013	U*	<0.00030	U I	<0.00030	U	<0.00030	<u>ַ</u> ע	<0.00030	Ū	<0.00030	U
Bromodichloromethane	0.005	0.005	17.7	<0.00020	U	<0.00020	- 11	0.0084 <0.00020	. "	<0.0010	U	0.0065	Ü	0.0092	Ū*]	0.0094	Ū*
Carbon tetrachloride		0.033	45	<0.00030	U.	0.0030		<0.00030	1 1	<0.00020	;	<0.00020	U	<0.00020	Ŋ	<0.00020	Ū
Chlorobenzene	0.005	0.005	8.05	<0.00030	็บ	<0.00030	Ü	<0.00030	i ii i	<0.00030		<0.00030	J U	<0.00030	U	<0.00030	U
hloroform	0.1	0.1	5.02	<0.00020	U	<0.00020	ֹ טֹ ֹ	<0.00020	. ü 🖠	<0.00020		<0.00030 <0.00020	, U	<0.00030	U	<0.00030	U
is-1,2-Dichloroethene		0.73	79	0.031		0.021	t t	<0.00030	. u 1	0.019	•	0.0016		<0.00020	ן ט	<0.00020	ָה <u>ה</u>
Dibromochloromethane	0.07	0.07	49.3	<0.00040	U	<0.00040	ົບີ	<0.00040	Ü	<0.00040	- i, †	<0.00040	ļ .	0.010 <0.00040	١∤	0.027	ļ J
Dichloromethane	0.005	0.024	52.5	<0.00040	Ü	0.00061	J	<0.00040	υ	<0.00040	Ū	<0.00040	. :	<0.00040		0.011	
etrachloroethene	0.005	0.005	154	<0.00050	U	0.00077	Ĵ	<0.00050	U	<0.00050	υ	<0.00050		<0.00040	٠	<0.00040	-:- 1
rans-1,2-Dichloroethene	0.003	0.005	2	<0.00040	Ų	<0.00040	Ü	<0.00040	υ	<0.00040	` ບ 🕆	<0.00040	U	<0.00040	. ,, }	<0.00050 0.0014	<u>ا</u> ۲
richioroethene	0.005	0.005	63	<0.00030	U	<0.00030	U	<0.00030	U	<0.00030		<0.00030	ับ	<0.00030	}	0.0014	ı
/inyl chloride	0.002	0.002	11	<0.00020	U	<0.00020		<0.00020	υÎ	<0.00020	υŤ	<0.00020	Ú	<0.00020		0.018	
lotes:		0.002	28	<0.00040	U	<0.00040	U	<0.00040	Ŭ.	<0.00040	ŭ 🕇	<0.00040	υĺ	<0.00040	·ŭβ	0.00078	- , -

- 1) MCL EPA Maximum Contaminant Level (EPA)
- 2) 1% of the aqueous solubility
- 3) mg/L = milligrams per liter
- 4) Flags:
 - U = analyzed but not detected above the listed method detection limit
 - U* = Data qualified as non-detect due to blank contamination
 - J = analyte detected below quantitation limit but above method detection limit

Bold value indicates a detection above the method detection limit Green shading indicates concentration exceeds TRRP PCL $\mathrm{GW}_{\mathrm{ing}}$ value.

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE RESULTS SUPPLEMENTAL ACC CHARACTERIZATION FORMOSA PLASTICS CORPORATION, TEXAS

	SCREENING CRITERIA			Monitoring Well ID											See a sangatoon	And ASS	
	11.41.22.02.02	TRRP PCL GWing	1% Solublilty	B-1	M(6005	B-2		B-3	000000066	B-4	100 10000	B-6	ASSAGARA.	В-7	Sila area (i)	B-8	Militari
	MCL (mg/L)	(mg/L)	(mg/L)	mg/L	Flag	mg/L	Flag	mg/L	Flag	mg/L	Flag	mg/L	Flag	mg/L	Flag	mg/L	Flag
Volatile Organic Compounds (VOCs)			· · · · · · · · · · · · · · · · · · ·			,	1						*********				1
1,1,2-Trichloroethane	0.005	0.005	44.2	0.14		<0.00030	Ü	<0.00030	U	<0.00030	Ū	<0.00030	U	0.057		<0.00030	U
1,1-Dichloroethane	15	15	55	0.086	1	<0.00030	υ	<0.00030	· U	<0.00030	ט	<0.00030	U	0.040	· ·	<0.00030	Ü
1,1-Dichloroethene	0.007	0.007	24	0.069		<0.00050	U i	<0.00050	U	<0.00050	U	<0.00050	U	0.0047		<0.00050	Ťυ
1,2-Dichloroethane	0.005	0.005	87	0.014		<0.00030	υ	<0.00030	υ	<0.00030	U	0.0030	1	0.033		<0.00030	Ü
1,3-Dichlorobenzene	-	2.2	1.1	0.00042	J	<0.00030	υ	0.00053	J	<0.00030	υ 1	<0.00030	U	<0.00030	U	<0.00030	U
Acetone	-	66	6000	<0.0010	ֹ ט	<0.0010	U	<0.0010	Ü	0.0074	U*	<0.0010	Tu	<0.0010	Ü	0.010	Ü*
Benzene	0.005	0.005	17.7	0.020		0.00029	J	<0.00020	U,	<0.00020	บ	<0.00020	U	0.014	i :	<0.00020	U
Bromodichloromethane	-	0.033	45	<0.00030	U	<0.00030	บ่า	<0.00030	Ü	<0.00030	U	<0.00030	U	0.0033	i -	<0.00030	ŢŲ
Carbon tetrachloride	0.005	0.005	8.05	0.0094		<0.00030	ΰ	<0.00030	U	<0.00030	Ū Ì	<0.00030	U	0.0030	ľ	<0.00030	U
Chlorobenzene	0.1	0.1	5.02	0.0023	<u> </u>	<0.00020	υ	<0.00020	U	<0.00020	Ū	<0.00020	ប	0.0019	i :	<0.00020	ľυ
Chloroform	-	0.73	79	0.78		0.0020		0.0070	•	0.013		0.015	1	<0.00030	U	0.017	† · ·
cis-1,2-Dichloroethene	0.07	0.07	49.3	0.047	1	<0.00040	Ų	<0.00040	U	<0.00040	U	<0.00040	U	0.013		<0.00040	†υ
Dibromochloromethane	-	0.024	52.5	<0.00040	U	<0.00040	Ü	<0.00040	ט	<0.00040	โ บ โ	<0.00040	ļυ	0.00077	J	<0.00040	† υ ·
Dichloromethane	0.005	0.005	154	0.0019	J	<0.00050	ָּט "	<0.00050	ט ו	<0.00050	Îΰ	<0.00050	ļυ	<0.00050	ŢŪ,	<0.00050	Ťυ
Tetrachloroethene	0.005	0.005	2	0.10	(<0.00040	U	<0.00040	ับ	<0.00040	ן ט	<0.00040	Ůυ	0.028	,	<0.00040	Ťΰ
trans-1,2-Dichloroethene	0.1	0.1	63	0.077	1	<0.00030	ני ל	<0.00030	ט 1	<0.00030	U	<0.00030	Ůυ	0.016		<0.00030	ľυ
Trichloroethene	0.005	0.005	11	0.16		<0.00020	ֹ ט ֹ	<0.00020	โบ โ	<0.00020	โ บ ใ	<0.00020	Ťυ	0.033		<0.00020	†υ
Vinyl chloride	0.002	0.002	28	0.057	-	<0.00040	ֹ טֹ	<0.00040	บ่า	<0.00040] U	<0.00040	Ü	0.041		<0.00040	Ü

- MCL EPA Maximum Contaminant Level (EPA)
 1% of the aqueous solubility
- 3) mg/L = milligrams per liter
- 4) Flags:
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TABLE 2

SUMMARY OF GROUNDWATER SAMPLE RESULTS SUPPLEMENTAL AOC CHARACTERIZATION FORMOSA PLASTICS CORPORATION, TEXAS

		SCREENING CRITE	Monitoring Well ID								
		TRRP PCL GWing	1% Solubility	D-45	valgavalari.	D-46	5/4/5/6/4/8Z	D-47			
	MCL (mg/L)	(mg/L) "	(mg/L)	mg/L	Flag	mg/L	Flag	mg/L	Flag		
Volatile Organic Compounds (VOCs)							sel sense Tallin	volene (Marcellina e substitut	a, pare T		
1,1,2-Trichloroethane	0.005	0.005	44.2	<0.00030	U	< 0.00030	U	<0.00030	U		
1,1-Dìchloroethane	15	15	55	<0.00030	ľul	<0.00030	บ่า	<0.00030	U		
1,1-Dichloroethene	0.007	0.007	24	<0.00050	1 0 1	<0.00050	U	<0.00050	U		
1,2-Dichloroethane	0.005	0.005	87	0.043	yl 1	<0.00030	υ	<0.00030	· u		
1,3-Dichlorobenzene	-	2.2	1.1	<0.00030	ับ	<0.00030	ΰ	<0.00030	l u		
Acetone	-	66	6000	<0.0010	101	< 0.0010	U	0.0085	Ū*		
Вепхепе	0.005	0.005	17.7	<0.00020	U	< 0.00020	U	<0.00020	Ùυ		
Bromodichloromethane		0.033	45	<0.00030	U	<0.00030	1 0 1	0.0031	1 .		
Carbon tetrachioride	0.005	0.005	8.05	<0.00030	U	<0.00030	1 0 1	<0.00030	ָ ט ו		
Chlorobenzene	0.1	0.1	5.02	<0.00020	u	<0.00020	u	<0.00020	l v		
Chloroform	-	0.73	79	0.0073	1 1	0.0048	1 1	0.046	†		
cis-1,2-Dichloroethene	0.07	0.07	49.3	<0.00040	U	<0.00040	1 0 1	<0.00040	י ט		
Dibromochloromethane	-	0.024	52.5	<0.00040	u	<0.00040	1 0 1	0.0011	†		
Dichloromethane	0.005	0.005	154	<0.00050	u	<0.00050	U	<0.00050	ן מין		
Tetrachloroethene	0.005	0.005	2	<0.00040	ן ט ן	<0.00040	ו ט ד	< 0.00040	Ťυ		
rans-1,2-Dichloroethene	0.1	0.1	63	<0.00030	ן ט ן	<0.00030	ו ט ל	<0.00030	Ū		
Trichloroethene	0.005	0.005	11	<0.00020	U	<0.00020	1 0 1	<0.00020	Ιυ		
/inyl chloride	0.002	0.002	28	<0.00040	TUT	< 0.00040	l u t	<0.00040	Ü		

Notes:

- 1) MCL EPA Maximum Contaminant Level (EPA)
- 2) 1% of the aqueous solubility
- 3) mg/L = milligrams per liter
- 4) Flags:
 - U = analyzed but not detected above the listed method detection limit
 - U* = Data qualified as non-detect due to blank contamination
 - J = analyte detected below quantitation limit but above method detection limit

Bold value indicates a detection above the method detection limit Green shading indicates concentration exceeds TRRP PCL GW_{ing} value.

TABLE 3

QA/QC - DUPLICATE SAMPLES VOC ANALYTICAL RESULT SUPPLEMENTAL AOC CHARACTERIZATION

Well Number / ID	D-4	5	Dup	-01	P-6	58	Dup-02			
Lab Sample / ID	1307039	9-03A	130703	9-12A	130703	9-15A	1307039-21A			
Sample Date	6/27/2	013	6/27/2	2013	6/28/2	2013	6/28/2013			
Analyte	Result (mg/L)	Flag	Result Flag		Result (mg/L)	Flag	Result (mg/L)	Flag		
1,1,2-trichloroethane	<0.00030		<0.00030		0.0013		0,0013			
1,1-dichloroethane	<0.00030		<0.00030		<0.00030		0.03			
1,1-dichloroethene	<0.00050		<0.00050		<0.00050		<0.00050			
1,2-dichloroethane (EDC)	0.043		0.041		0.0050		0.0049			
1,3-dichlorobenzene	<0.00030		0.00041	J	<0.00030		<0.00030			
Acetone	<0.0010		<0.0010		<0.0010		0.01	U		
Benzene	<0.00020		<0.00020		<0.00020		<0.00020			
Carbon tetrachloride	<0.00030	_	<0.00030		<0.00030		<0.00030			
Chloroform	0.0073		0.0071		0.027		0,027			
Cis-1,2-Dichloroethene	<0.00040		<0.00040		<0.00040		0.011			
Dichloromethane	<0.00050		<0.00050		<0.00050		0.00066	J		
Tetrachloroethene	<0.00040		<0.00040		0.0014		0.0013			
Trans-1,2-Dichloroethene	<0.00030		<0.00030		<0.00030		0.00097	J		
Trichloroethene	<0.00020		<0.00020		0.018		0.017			
Vinyl chloride	<0.00040		<0.00040		0.00078	J	0.00067	. J		

Notes:

See Appendix for complete list of VOC analytes

- See Appendix for Data Usability Summary
 U Potentially contaminated; The analyte was not detected >5x (10x for common contaminants) the level in an associated blank and thus should be considered not detected above the level of the associated numerical value (i.e., the reported sample concentration).
- J Lab qualifier indicating the analyte was detected above the sample detection limit (SDL) but below the method quantitation limit (MQL).

TABLE 4

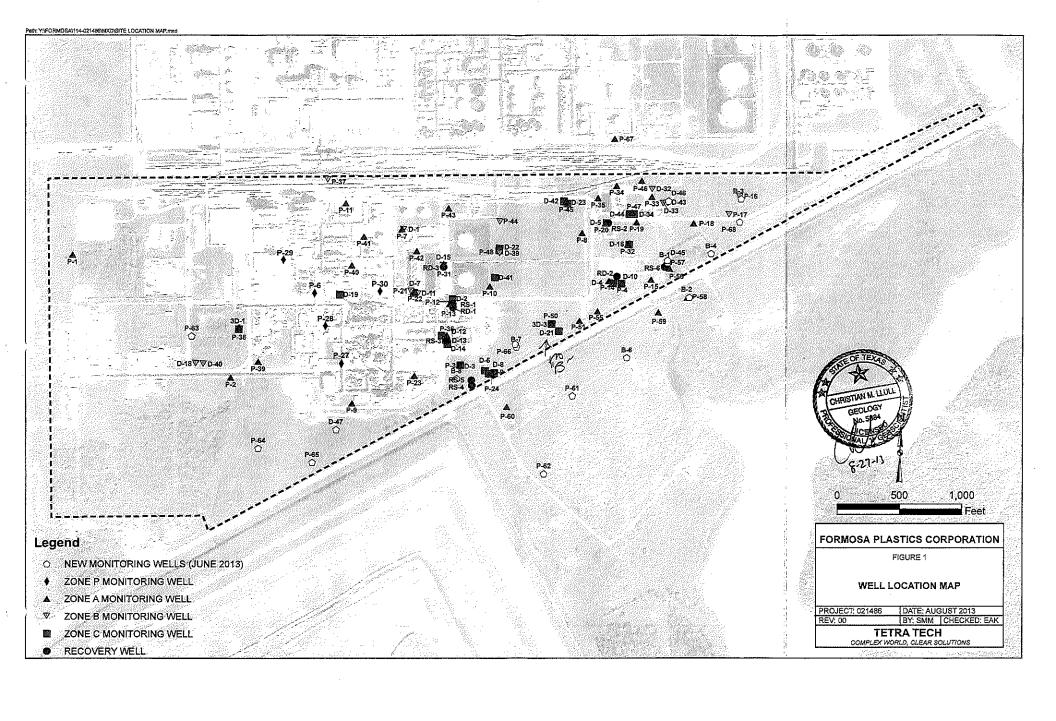
TRIP AND FIELD BLANK ANALYTICAL RESULTS
SUPPLEMENTAL AOC CHARACTERIZATION

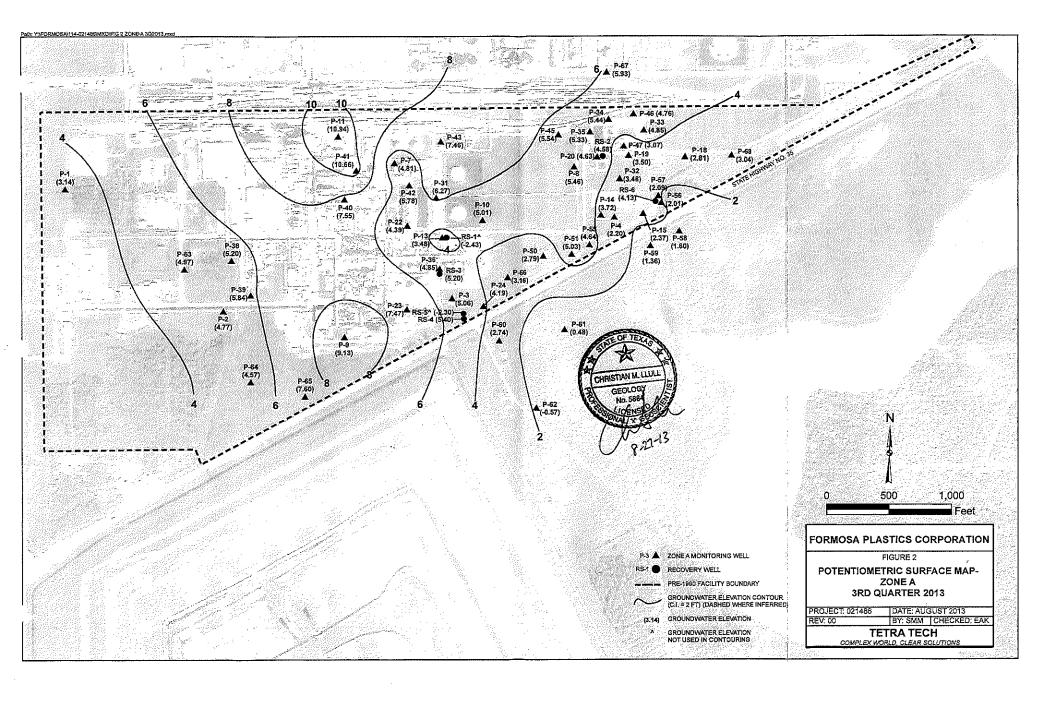
Well Number/ID Trip Blank 1 FB-01 FB-02 1307039-16A 1307039-22A 1307039-05A Lab Sample/ID Analyte Result RI Result Result 1,1,1-trichloroethane < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 1,1,2,2-tetrachloroethane < 0.00050 <0.00050 <0.00050 <0.00050 < 0.00050 < 0.00050 1,1,2-trichlor-1,2,2-trifluoroethane < 0.00040 < 0.00040 < 0.00040 < 0.00040 < 0.00040 < 0.00040 1,1,2-trichloroethane < 0.00030 < 0.00030 < 0.00030 < 0.00030 <0.00030 < 0.00030 1.1-dichloroethane <0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 1.1-dichloroethene < 0.00050 1,2,4-trichlorobenzene < 0.00050 < 0.00050 < 0.00050 <0.00050 <0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 1.2-dibromo-3-chloropropane < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 1,2-dibromoethane 1,2-dichlorobenzene <0.00040 <0.00040 <0.00040 <0.00040 <0.00040 < 0.00040 1,2-dichloroethane (EDC) <0.00030 <0.00030 <0.00040 <0.00040 <0.00030 < 0.00030 <0.00030 < 0.00030 < 0.00040 1,2-dichloropropane < 0.00040 < 0.00040 < 0.00040 1,3-dichlorobenzene < 0.00030 < 0.00030 <0.00030 <0.00030 < 0.00030 < 0.00030 < 0.00030 <0.00030 1.4-dichlorobenzene < 0.00030 <0.00030 < 0.00030 < 0.00030 2-butanone <0.00040 < 0.00040 < 0.00040 < 0.00040 < 0.00040 < 0.00040 <0.00080 <0.00080 <0.00080 <0.00080 2-hexanone <0.00080 < 0.00080 <0.00060 <0.00060 < 0.00060 < 0.00060 < 0.00060 4-methyl-2-pentanone < 0.00060 acetone <0.001 < 0.001 0.0062 < 0.001 0.0069 < 0.001 <0.00020 < 0.00020 < 0.00020 < 0.00020 < 0.00020 < 0.00020 benzene <0.00030 <0.00030 <0.00030 < 0.00030 bromodichloromethane <0.00030 <0.00030 bromoform <0.00040 <0.00040 < 0.00040 <0.00040 < 0.00040 < 0.00040 < 0.0010 < 0.0010 < 0.0010 bromomethane < 0.0010 < 0.0010 < 0.0010 carbon disulfide < 0.00070 <0.00070 <0.00070 <0.00070 < 0.00070 < 0.00070 < 0.00030 carbon tetrachloride <0.00030 < 0.00030 < 0.00030 <0.00030 < 0.00030 <0.00020 <0.00020 <0.00020 < 0.00020 < 0.00020 chlorobenzene <0.00020 chloroethane <0.00050 <0.00050 <0.00050 <0.00050 < 0.00050 <0.00050 <0.00030 <0.00030 chloroform < 0.00030 < 0.00030 < 0.00030 < 0.00030 < 0.00030 <0.00030 <0.00030 <0.00030 < 0.00030 < 0.00030 chloromethane cis-1,2-dichloroethene < 0.00040 <0.00040 | <0.00040 | <0.00040 | <0.00040 | <0.00040 cis-1,3-dichloropropene < 0.00040 <0.00040 | <0.00040 | <0.00040 | <0.00040 < 0.00040 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 cvclohexane dibromochloromethane < 0.00040 <0.00040 <0.00040 <0.00040 <0.00040 <0.00040 <0.00030 <0.00030 <0.00030 <0.00050 <0.00050 <0.00050</p> <0.00030 <0.00030 dichlorodifluromethane < 0.00030 < 0.00050 < 0.00050 < 0.00050 dichloromethane < 0.00030 <0.00030 | <0.00030 | <0.00030 | <0.00030 | <0.00030 ethylbenzene <0.00030</td> <0.00030</td> <0.00030</td> <0.00060</td> <0.00060</td> <0.00060</td> <0.00030 <0.00030 isopropylbenzene < 0.00030 <0.00030 <0.00060 <0.00060 m,p-xylene < 0.00060 <0.00030 <0.00030 | <0.00030 | <0.00030 | <0.00030 | <0.00030 methyl acetate <0.00020 <0.00020 <0.00040 <0.00040 <0.00020 < 0.00020 < 0.00020 methyl tert-butyl ether (MTBE) < 0.00020 methylcyclohexane < 0.00040 <0.00040 <0.00040 <0.00040 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 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<0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 <0.00030 o-xylene <0.00030 <0.00030 <0.00040 <0.00040 < 0.00030 styrene tetrachloroethene < 0.00040 <0.00040 <0.00040 < 0.00040 toluene < 0.00030 <0.00030 | <0.00030 <0.00030 <0.00030 < 0.00030 trans-1,2-dichloroethene <0.00030 | <0.00030 | <0.00030 < 0.00030 < 0.00030 < 0.00030 trans-1,3-dichloropropene <0.00040 < 0.00040 < 0.00040 <0.00040 < 0.00040 < 0.00040 trichloroethene < 0.00020 <0.00020 | <0.00020 | <0.00020 < 0.00020 < 0.00020 <0.00040</td> trichlorofluoromethane < 0.00040 vinyl chloride < 0.00040 <0.00090 <0.00090 <0.00090 <0.00090 <0.00090 <0.00090 xylenes, total

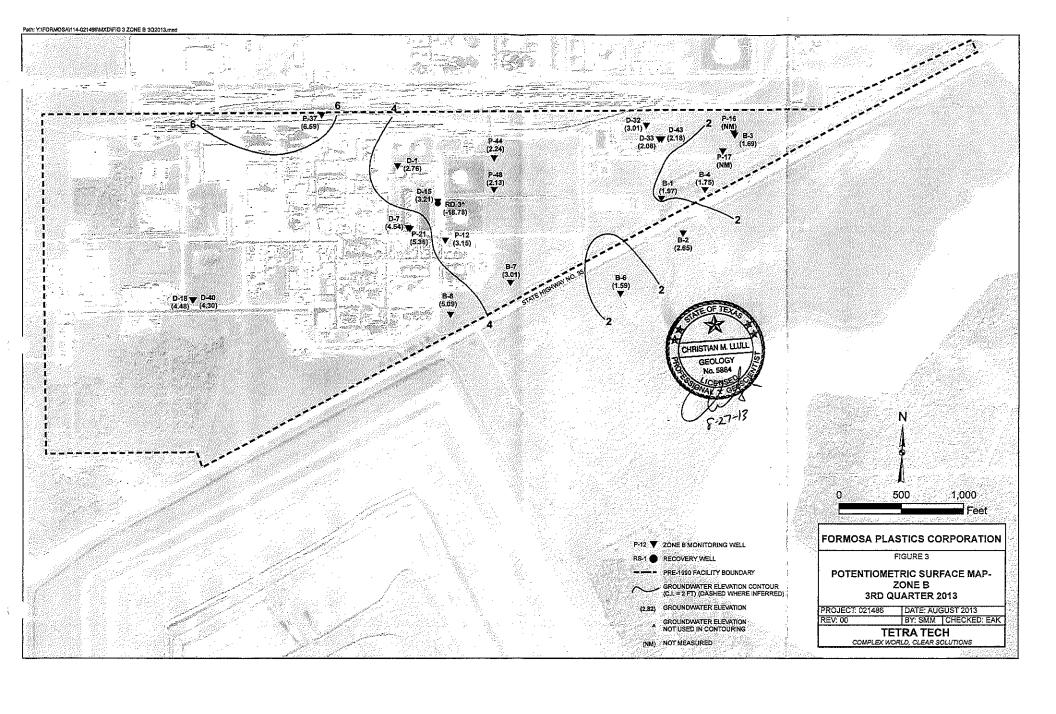
Notes

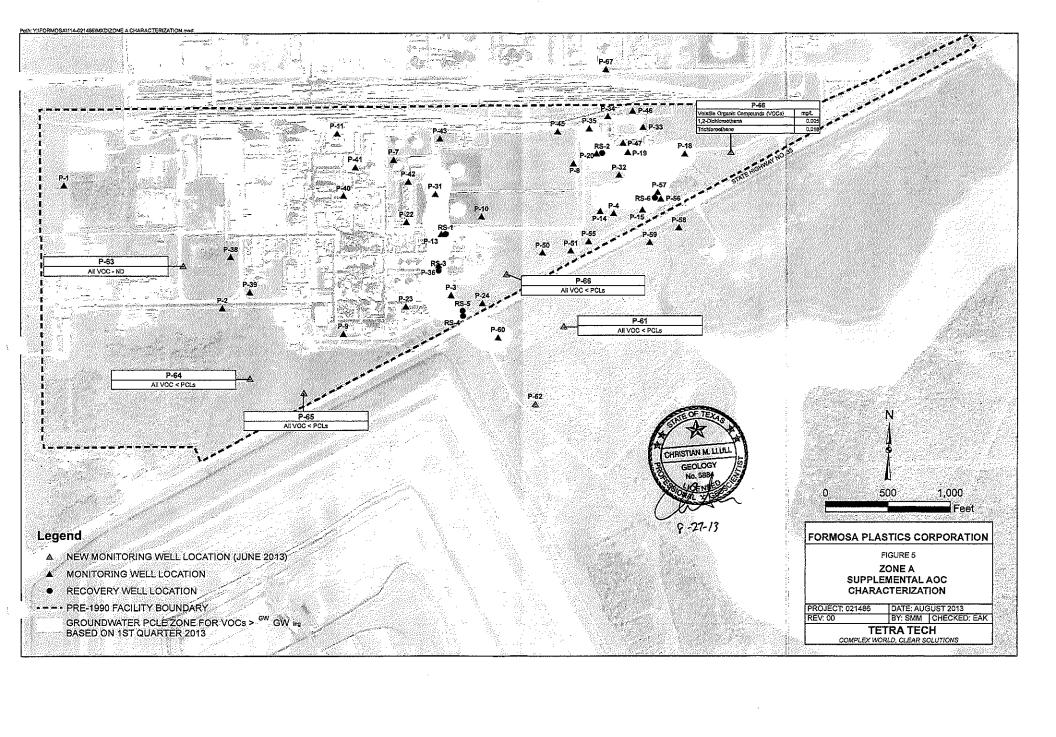
The reviewer qualified all nine detects for acetone as potentially contaminated (U) due to detection of the analyte in the associated field blank. In each case, the analyte should be considered not detected at or above the reported concentration.

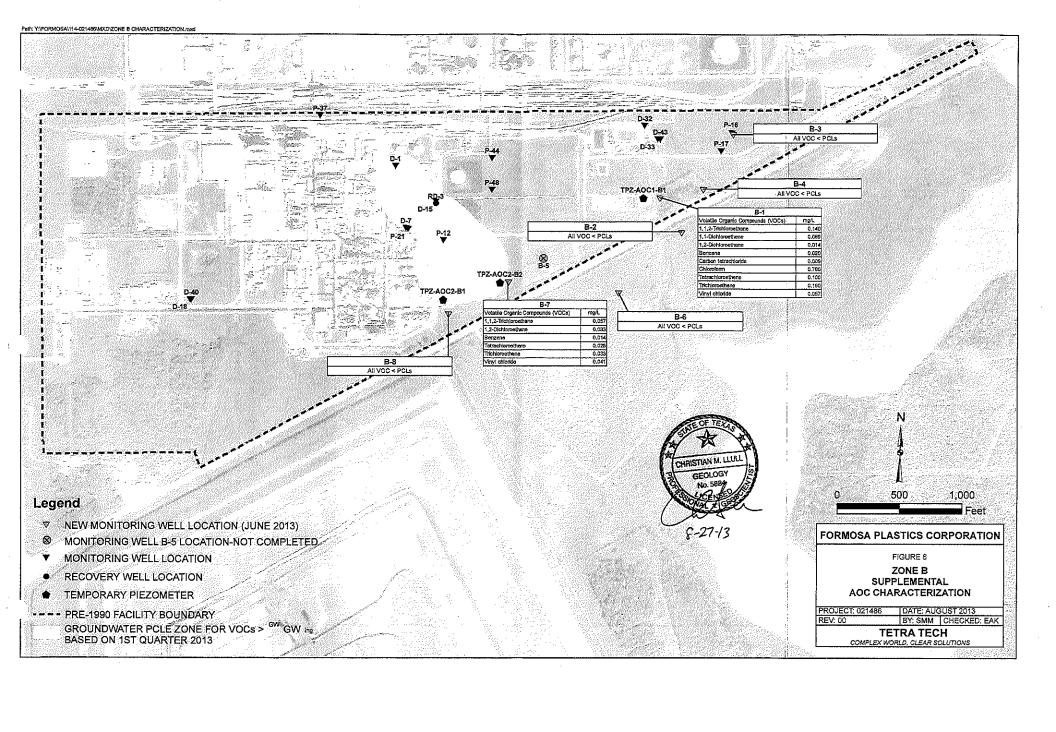
FIGURES











Legend

- NEW MONITORING WELL LOCATION (JUNE 2013)
- MONITORING WELL LOCATION
- RECOVERY WELL
- PRE-1990 FACILITY BOUNDARY

GROUNDWATER PCLE ZONE FOR VOCs > ^{GW} GW ing BASED ON 1ST QUARTER 2013

FORMOSA PLASTICS CORPORATION

ZONE C SUPPLEMENTAL **ACC CHARACTERIZATION**

FIGURE 7

PROJECT: 021486 REV: 00

DATE: AUGUST 2013

TETRA TECH COMPLEX WORLD, CLEAR SOLUTIONS

APPENDIX A BORING LOGS

		E	ra te	CH			LOG OF BORING B-1						Page 1 of 3		
Project Name: F	PC-TX SL	JPPLE	MENT	AL A	.00	CHAF	RACT	ERIZATION		, valore			<u> </u>		
Borehole Location:	Former	wwı	Р				***************************************	Surface Elevation:	14.69						
⊰orehole Number:	B-1						oreho iamel	ile er (in.):	Date Started:	6/12/2013	Date F	inished	l: 6/	12/20)13
88		ERY (%)	'ENT (%)		IDEX	(%			-	L OBSERVATION OF Completion of December 1		<u>Ā</u>		m	
DEPTH (ff) OPERATION TYPES SAMPLE STANDARD OF PENETRATION		SAMPLE RECOVERY (%)	MOISTURE CONTENT (%) DRY DENSITY (pdf)	F LIQUID LIMIT	T PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	ERIAL DESCF	RIPTION		DEPTH (ft)			AGRAM 17.63 (ft)
5	0 0.4 4.5 7.5 0 0.1 0.2 3.6 ton Proposition Propositio	enetrom ane She	neter (1	Deerat yyes:	ion Mud	ry inuous it Auge		very stiff, with ro-OH- ORGANIC organic material -CL- SILTY CLA stiff, with abunda -CL- SILTY CLA calcareous modul Thin silt layer, calcareous @ 4. -CL- SANDY CL very fine grained lenses, jointed, silt man Calcareous @ -CL- SILTY CLA jointed, with man Calcareous @ -CL- SANDY CL medium stiff to slight gray mottling -SM- SILTY SAN grained sand/silt, -CL- SANDY CL very stiff, with man jointed. -SM- SILTY SAN grained sand/silt, -CH- FAT CLAY manganese oxide Mottled with ta -CH- FAT CLAY modules and oxid -CH- FAT CLAY abundant calcare nodules. SILTY CLAY (CH) CH- SANDY FA	ots and organic model of CLAY: Dark browthroughout, with ray: Dark gray brownial, dry. AY: Dark gray brownial, dry. AY: Brown to gray ant calcareous noway: Reddish tan, railes, jointed. Teddish tan and valued the tank of the tank o	vn to black, soft, with cots, wet. wn, stiff, with roots as brown, stiff to medicules. nedium stiff, with white, loose, highly soft to medium stiff, out, with occasional of the county of the count	with clayey other to state of the state of t	0.5 -4.2 -2.1 -3.5 -4.4 -6.5 -11.5 -12.5 -14.9 -18.5 -19.6		Type S.S.	Concrete seal and pad
Logger: Christian M.		DINC		rilling	Rota		L\/ ::_s	Casing	actor: Boart Longy	year				· · ·	···········

	TE TETRA TECH										LOG OF BORING B-1					Page 2 of 3		
Project	Name	э: FP	C-TX SL	JPPI	LEMI	ENT	AL A	OC (CHAF	RACT	TERIZATION	7 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 1						· · · · · · · · · · · · · · · · · · ·
Boreho	le Loc	ation:	Former	W۷	VTP						Surface Elevation:	14.69						
ےorehoے	le Nu	mber:	B-1						B	oreho Diamet	ile er (in.):	Date Started:	6/12/2013	Date Fi	nished	6	/12/2	013
7.1	SI	Z		ERY (%)	TENT (%)	රූ)		ZDEX	(%)	and the state of t	While Drilling $\overline{\underline{Y}}$		L OBSERVATIO on Completion of Dr		Ā		m	
DEPTH (ft)	SAMPLE	STANDARD PENETRATION TEST	(mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	고 PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	RIAL DESCF	RIPTION		DEPTH (ft)	WE	ILL DI	IAGRAM
30			4.6					**************************************			nodules, more red -CH- FAT CLAY: hard, with occasio	ldish tan`and ver Light gray and re anal oxidation and	eddish tan, very stiff d calcareous nodules	to	27			
			0								brown mottling, so throughout.	oft to medium stif			32.5			– 3/8" bentonite chip seal
			0								oxidized, with calc Slickensides, fr	areous material t acture planes @	33.5 ft.		 _34	11.0	Market .	
35													ht brown, soft, mode to CLAYEY SILT (MI		35	: :		
			0.4								to medium stiff, no	o oxidation, no ca	own and light brown, alcareous material, n	noist.	38.5			- 20/40 silica sand
40			0	To the state of th									very stiff to hard, slig naterial and nodules,					
45			0		The state of the s						Becoming more							- 0.010"
45			0	- Warner of the same of the sa	i i						ft.	·	olanes @ 42.5 ft and orizontal, with large	46.0				S.S. screen
50			0								calcareous nodule	s and staining @ /: Tan and reddis		ard,	48 _ 50			
Sample Types:		Split Spoor Shelby Samp Grab Samp Samp	v ∭v • Mc • ∭s	ane s	omete Shear nia)peratypes:	Mud Rota Con Fligi Was Rota	tinuou nt Aug sh		Auger Notes Air Rotary Core Barrel Drive Casing Conic Rig 128 Contra		year					

,	TE TETRAT	TECH	LOG OF BORING B-1	Page 3 of 3
Project Name: F	PC-TX SUPPLEMEN	NTAL AOC CHARA	CTERIZATION	
Borehole Location:	Former WWTP		Surface Elevation: 14.69	
∂orehole Number:	B-1	Bore Diar	hole neter (in.): Date Started: 6/12/2013 Date Finished	: 6/12/2013
S II N	ERY (%)	cf) NDEX %)	WATER LEVEL OBSERVATIONS While Drilling m Upon Completion of Drilling Remarks:	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G PENETRATION	PID (Spm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pcf) LIQUID LIMIT D PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION (2) HEAD	WELL DIAGRAM
			-CH- FAT CLAY: Reddish tan with occasional gray mottling, very stiff to hard, with manganese oxide staining.	20/40 silica sand - 3/8" bentonite chip backfill - Native slough
			Bottom of borehole at 57.0 feet.	
Sampler Spling Sport Spo	iby Vane Shear	Operation Types: Mud Rotary Continuous Cight Auger Wash Rotary	Auger Notes: Air Rotary Core Barrel Drive Casing	
Logger: Christian M.		Drilling Equipment:	Sonic Rig 128 Contractor: Boart Longyear	

	TE TETRA TECH											L	_OG OF BORING B-2		•			age of 2
Projec	ct N	ame		C-TX SI	JPP	LEM	ENT,	AL A	.OC (CHAI	RAC	TERIZATION						
Borel	ıole	Loc	ation:	Former	-Bro	okinę	gs Pı	roper	ty			Surface Elevation:	15.3					
⊰oreh	ıole	Nun	nber:	B-2							Boreho Diame	ole ter (in.):	Date Started: 6/21/2013	Date F	inished	d: 6	/21/2	013
	ES		7		ERY (%)	ENT (%)	.j.		DEX				WATER LEVEL OBSERVATION Market		Ā		m	
DEPTH (ft)	OPERATION TYPES	SAMPLE	STANDARD PENETRATION TEST	(mdd) Gld	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	ERIAL DESCRIPTION		DEPTH (ft)			/AGRAM v: 18.05 (ft) s.
		33		1	 	-		-				-CL- SILTY CLA	Y: Mottled brown and reddish brown		1	D	P	J
												medium stiff, with	n roots. Y: Dark brown to black, soft to mediu	 IM	+1	47.	< 0	~ Concrete
-												stiff. Dry, slightly fri	able @ 1-3 ft.		-	P (2	seal and pad
-												Slightly moist (_		\vdash		× ×	
-												-CL- SILTY CLA	Y: Reddish tan to lìght reddish tan, n	nedium	4			
5													calcareous material.		-			
_													-, -, -, -, -, -, -, -, -, -, -, -, -, -					
	Ш														-,,			
	į												: Reddish brown with occasional gray		7.5			
												oxide staining.	stiff to stiff, with occasional mangan	ese				
10												Thin, SANDY	CLAY (CL) @ 8.8-9 ft.		40.0			
													AY: Reddish tan, soft, with yellowish					
													TY SAND (SM) lenses. (SM) layer @ 11-12 ft.					
		} }}			-							5: 0" TV 01 A			12.5			
-		}										to medium stiff, w	Y: Light reddish brown to reddish tan vith occasional gray mottling, jointed,	, sott fatter	-			
_												with depth.			-			
15															<u> </u>			
											<i>\\\\\</i>				-			 Cement/ Bentonite grout
4				-									thin clayey lenses @ 16.5-17 ft.					giout
												 -SM- SILTY SAN very fine grained. 	ID: Light brown to yellowish brown, lo	iose,				
										ı		With clayey ler	nses @ 18-18.5 ft.		18.5			
20				-								stiff to medium sti	Y: Light gray with yellowish brown mo iff, with occasional calcareous nodule	xtling, ≳s.	20			
													Y: Light gray mottled with abundant specks, soft to medium stiff, with		<u> </u>			
												occasional tan lay	ers at depth.		21.5	Ŋ.		
		} }}										-CL- SILTY CLA' stiff, with common	Y: Light brown and tan, soft to mediu n calcareous nodules.	m	-			
-								.	.			Softer and sand			-			
												-CL- SILTY CLA	Y: Yellowish brown and gray, occasio	nallv	24			
25 Sampl		<u> </u>	71 Snlit				$\frac{1}{10}$	nerat	ion			mottled with reddis	sh tan, medium stiff, with calcareous			₩_	<u>M</u>	
Sampl Types	: :	Ľ	Split Spoon	p-4		omete	Ţ	perat ypes:	Mud			Auger Notes): -					
ſ		17	Shelby	تصي	ane S	Shear			Rota	ıry	<u></u>	Air Rotary						
			Bulk Sample		aliforr	nia			_	inuous it Auge	år 👢	Core Barrel						
		6	n Grab Sample	e KKS So	onic				Was Rota	n ry	\triangle	Drive Casing						
Logge	r:	Chris	stian M. Llu	ılı .			D	rilling	Equi	pment	t: s	onic Rig 128 Contra	actor: Boart Longyear					

TETRA	ATECH	LOG OF BORING B-2	Page 2 of 2
Project Name: FPC-TX SUPPLEME	ENTAL AOC CHARAC	TERIZATION	***
Borehole Location: Former Brooking	gs Property	Surface Elevation: 15.3	-
Borehole Number: B-2	Boreh Diam	nole eter (in.): Date Started: 6/21/2013 Date Finished:	6/21/2013
BOLEVIOLE NO TYPES SAMPLE SAMPLE PA TEST SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pdf) Liquid Limit Plasticity index	water (in.): Date Started: 672 1720 13 Date Finished: WATER LEVEL OBSERVATIONS While Drilling	m WELL DIAGRAM - 3/8" bentonite chip seal - 20/40 silica sand 20/40 silica sand
Sampler Types: Spoin Penetrometer Spoon Vane Shear Bulk Sample California Sample Sonic Constian M. Liuli	Mud Rotary Continuous Flight Auger Wash Rotary	Auger Air Rotary Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear	

	TE TETRA TECH										LOG OF BORING B-3							P:	age of 3
Project Na	ame	: FPC	C-TX SU	IPPL	.EMI	ENT	۹L A	000	CHAI	RACT	ERIZATION	1					1		
Borehole	Loc	ation:	Former	WΜ	/TP						Surface Elevat	tion:	20.04					-	
ರ್ವಾ	Nun	nber:	B-3						E	Boreho Diame	le ter (in.):		Date Started:	6/16/2013	Date F	inished	l: 6	/16/2	013
S		_	Average and the property of the second state o	ERY (%)	ENT (%)	f)		DEX	(9		While Drilling Remarks:			OBSERVATION OF Dr		Ā		m	
DEPTH (ft) OPERATION TYPES	SAMPLE	STANDARD STANDARD TEST	PID (ppm)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pd)	다 uauid LIMIT	프 PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	M	1ATE	RIAL DESCR	LIPTION		DЕРТН (ft)			AGRAM 22.98 (ft)
			0								-CL- SILTY medium stif			own and reddish bro	own,	1	12	P	
			0								-CH- FAT (lighter with o Silty @ 3	CLAY: depth. 3-3.5 ft	Dark gray, stiff, v	very plastic, with roo	· 	3.5	X 4 4	A A A	Concrete seal and pad
5			0.3								tan, with cal			rotown, gray and ro	uusii	_			
			0.2								-ML- SILT: dense. Grading t	Reddito LEA	N CLAY (CL) @ Reddish brown w	ish tan, loose to me	dium	7.5 8.5 9.2			
			0.4 1.1								slightly claye	Y SAN ey. / CLA\	D: Reddish tan to ': Mottled reddish	yellowish brown, lo brown and gray, th manganese oxide		11			
15			0								stainingCL- SILTY Grades to With gray	/ CLA\ o CLA` y mottl	': Reddish tan, so YEY SILT (ML) @ ing, stiffer @ 12.	oft, lighter with depth g 11.5-12.5. 5-13 ft.).)	13			
			0									th man	ganese oxide stai	stiff, with occasional ining.	gray	- -17.3			
			0			0000					stiff to stiff, \	with al	oundant oxidation	llowish brown, medi , jointed. , loose, moist, gradii		18.8			
20			0								\CLAYEY SII - CH- FAT C -√jointed, shar	LT (ML CLAY: p lowe	.). Reddish brown, n r contact.	nedium stiff to stiff,		20.7			Cement/ Bentonite grout
			0								tan, with cale	careou	s nodules and m	anganese oxide stai ocky @ 21-23.8 ft.					
25	}										-CL- SILTY abundant ca	CLAY	: Gray, medium s us nodules, jointe	stiff to stiff, with ed, with manganese	oxide				
Sampler Types:		Split Spoon Shelby Bulk Sample Grab Sample	Va M Ca	ne Si aliforn		, O	perati /pes:	Mud Rota	nuous t Auge h		7	Notes:							
Logger:	Chris	tian M. Llul	<u> </u>			Di	rilling	Equip	ment	: Se	onic Rig 128 C	Contra	ctor: Boart Longye	ear					

:	TE TETRA	ATECH	LOG OF BORING B-3	Page 2 of 3	
Project Name: F	PC-TX SUPPLEME	ENTAL AOC CHARA	CTERIZATION		
Borehole Location:	Former WWTP		Surface Elevation: 20.04		
Borehole Number:	B-3	Bor Dia	ehole neter (in.): Date Started: 6/16/2013 Date Finishe	d: 6/16/2013	
DES N	TERY (%)	of)	WATER LEVEL OBSERVATIONS While Drilling	m	
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G STANDARD		DRY DENSITY (pdf) F LIQUID LIMIT B PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION WHATERIAL DESCRIPTION	WELL DIAGRAM	
- \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	0		Faults and slickensides every 6 in. throughout, very stiff, fatter with reddish tan mottling @ 28-31 ft. CH- FAT CLAY: Gray and yellowish tan, soft to medium		
	0		stiff Silt lenses @ 36.5 ft Becoming reddish brown @ 36.8 ftCH- FAT CLAY: Reddish brown with gray veins, occasionally reddish tan, with occasional manganese oxide staining.	- 3/8" bentonite chip	
	0 0.1		Predominately reddish brown @ 42.3-45.5 ft Silty, with thin silt lenses @ 43-44 ft. CL- SANDY CLAY: Reddish tan to reddish brown, with occasional gray clay, medium stiff, oxidized.	seal 20/40 silica sand	
Sampler Spot	GA)	Operation Types: Mud Rotary	Layer of oyster shell fragments @ 46.4-46.7 ft Becoming off-white to very light gray SANDY CLAY (CL) with yellowish brown mottling @ 46.7 ft CH- SANDY FAT CLAY: Light gray, occasionally off-white with yellowish tan mottling, medium stiff to very stiff, with fracture planes, with very small calcareous nodules. Auger Notes:	0.010" S.S. screen	
Bulk Samı Grab Samı Logger: Christian M. L	ole Sonic	Continuous Flight Auger Wash Rotary Drilling Equipment:	Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear		

	TE TETRA	тесн	LOG OF BORING B-3	Page 3 of 3
Project Name: F	PC-TX SUPPLEME	NTAL AOC CHARAC	CTERIZATION	**************************************
Borehole Location:	Former WWTP		Surface Elevation: 20.04	
⊰orehole Number:	B-3	Bore Diam	chole neter (in.): Date Started: 6/16/2013 Date Finished:	6/16/2013
N ES	ERY (%)		WATER LEVEL OBSERVATIONS While Drilling ☑ m Upon Completion of Drilling ☑ Remarks:	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G PENETRATION	PID (ppm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pdf) LIQUID LIMIT DRY PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION (E) HE HE HE HE HE HE HE HE HE	WELL DIAGRAM
	0 0		Slickenside, soft @ 48 ft. Natural fracture, increased yellowish brown mottling @ 51.5 ft Heavily calcareous, with abundant large nodules, manganese oxide staining, and abundant oxidation @ 51.5-53.5 ft. -CH- FAT CLAY: Light gray and yellowish brown, medium stiff to stiff, with abundant oxidation and calcareous nodules. CL- SILTY CLAY: Reddish brown with gray mottling, medium stiff, slightly sandy, with trace calcareous material and oxidation staining. Bottom of borehole at 57.0 feet.	- 3/8" bentonite chip backfill
Sampler Spli Spli Spo She Sam Sam Sam Sam Sam Logger: Christian M.	Vane Shear California Sonic	Operation Types: Mud Rotary Continuous Flight Auger Wash Rotary Drilling Equipment:	Auger Air Rotary Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear	

	TETRA	TECH	LOG OF BORING B-4	Page 1 of 2	
Project Name: F	PC-TX SUPPLEME	ENTAL AOC CHARAC	CTERIZATION		
Borehole Location:	Former TxDOT Pi	icnic Area	Surface Elevation: 17.8		
3orehole Number:	B-4	Borel Diam	hole Date Started: 6/21/2013 Date Finished:	: 6/21/2013	
89 7	ERY (%)	EX	WATER LEVEL OBSERVATIONS While Drilling	m	
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G STANDARD	PID (PPM) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pdf) The Liquid Limit Description (%) MINUS NO. 200 (%) GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM Casing Top Elev. 20.3 (ft) Casing Type: S.S.	
5 10 15 25 Sampler Types: Spin She Bulk Sarr Gral Sam Gral Sam Gral Sam Gral Sam	ton Penetrometer Apple California	Operation Constitution	-CL- SILTY CLAY: Dark brown to black, soft to medium stiff, organic-rich. - Grading to ORGANIC CLAY (OH) @ 0-2 ft Transition zone with reddish brown mottling @ 2.5-3 ft. -CL- SILTY CLAY: Reddish brown, medium stiff, with occasional manganese oxide stianing Gray mottling @ 4-5 ft SILT (ML) @ 5-6 ft Reddish tan in part @ 6-7 ft Slightly moist @ 7-8 ft Blocky @ 8-9 ft Increasing gray veins @ 9-13 ft. - Increasing gray veins @ 9-13 ft. - Increasing gray veins @ 9-13 ft. - LAYEY SAND (SC) layer @ 16.6-16.8 ft SMDY CLAY (CL) layer @ 15.5-15.7 ft CLAYEY SAND (SC) layer @ 16.6-16.8 ft SM- SILTY CLAY: Light brown to yellowish brown, loose, very fine to fine grained, wet. - CL- SILTY CLAY: Light brown to medium stiff, with occasional gray and yellowish brown mottling Transition zone, mottled, thirty laminated @ 17.8-18.8 ft. - CL- SILTY CLAY: Light gray to gray, occasionally greenish gray, very stiff to hard, with abundant calcareous nodules and iron nodules, more plastic at depth. Auger Notes: Air Rotary Core Barrel Drive Casing	Casing Type: S.S. P	
Logger: Christian M.	Llull	Drilling Equipment:	Sonic Rig 128 Contractor: Boart Longyear		

	TE TETRA	тесн		LOG OF BORING B-4	Page 2 of 2		
Project Name: F	PC-TX SUPPLEME	ENTAL AOC CHARA	ACTE	ERIZATION			
Borehole Location:	Former TxDOT P	Picnic Area	s	Surface Elevation: 17.8			
Jorehole Number:	B-4	Bo Dia	rehole amete	er (in.): Date Started: 6/21/2013 Date Finished	6/21/2013		
ES N	ERY (%)	of) NDEX %)		WATER LEVEL OBSERVATIONS While Drilling ☑ m Upon Completion of Drilling ☑ Remarks:	m		
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD OPENETRATION	PID (ppm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pd) F LIQUID LIMIT D PLASTICITY INDEX MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION (#)	WELL DIAGRAM		
30 - - - - - - - - - - - - - - - - - - -				Occasional light yellowish brown mottling @ 23-27 ft. Calcareous lens @ 26.7 ft. Transition zone, moist, with silt lenses, light brown, occasionally reddish tan and gray @ 27 ft. -CL- SILTY CLAY: Reddish brown to reddish tan, medium stiff to very stiff, with occasional gray mottling, occasionally soft, with large calcareous blebs, dry, transitional zone. -CL- SILTY CLAY: Reddish brown and gray, soft to medium stiff, jointed, slightly sandy with thin silt lenses. -CH- FAT CLAY: Reddish brown with gray veins, medium stiff to very stiff, with occasional manganese oxide staining, blocky. Silt lenses @ 37-38 ft.	- 3/8" bentonite chip seal 20/40 silica sand		
				-SM- SILTY SAND: Light reddish tan to yellowish brown, loose to medium dense, with occasional gray mottling, micaceous, grading to SANDY CLAY (CL) and CLAYEY SAND (SC). -CL- SILTY CLAY: Reddish brown with gray mottling, stiff to very stiff. Grading to SANDY CLAY (CL), reddish tan @ 41.3-41.5 [ft. -SC- CLAYEY SAND: Reddish tan, loose, very fine grained, with occasional gray mottling, moist, grading to SANDY CLAY (CL). Oyster shell fragments @ 42.3-42.5 ft. Erosional contact @ 42.5 ft. CL- SILTY CLAY: Light gray to greenish gray, very stiff to	S.S. screen 20/40 silica sand		
				stiff, with abundant calcareous nodules throughout, with occasional reddish tan mottling Slightly sandy @ 44-46 ft. Bottom of borehole at 47.0 feet.			
Sampler Types: Spin She	Iby Vane Shear Capte California Sonic	Operation Types: Mud Rotary Continuous Flight Auger Wash Rotary Drilling Equipment:		Auger Notes: Air Rotary Core Barrel Drive Casing Contractor: Boart Longyear			

TE TETRATECH										LOG OF BORING B-5	Page 1 of 2
Project Name:	FPC	-TX SU	PPL	.EMI	ENT	AL A	oc (CHAF	RAC1	FERIZATION	11/7
Borehole Loca	tion:	VCM Ar	ea	.,, .,,.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	******					Surface Elevation: 19	-
3orehole Num	ber: E	3-5						E	Boreho Diamet	ple cler (in.): Date Started: 6/19/2013 Date Finished:	6/19/2013
<i>σ</i>	7		ERY (%)	ENT (%)	a)		IDEX	(9)		WATER LEVEL OBSERVATIONS While Drilling ☑ m Upon Completion of Drilling ☑ Remarks:	m
DEPTH (ft) OPERATION TYPES SAMPLE	STANDARD G PENETRATION TEST	(mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	T LIQUID LIMIT	T PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION (2) HE delay	WELL DIAGRAM
10 Sampler Types:	SPT Split Spoon			omete		Dperal ypes:	ion			-CL- SILTY CLAY: Brown, soft, with organic material and roots, slightly moist Thin reddish brown layer @ 1.3-1.5 ftCL- SILTY CLAY: Dark gray to dark gray brown, soft to medium stiff, stiffer with depth Occasional yellowish brown mottling @ 3-3.5 ftCL- SILTY CLAY: Brown to light reddish brown, medium stiff to stiff, with manganese oxide staining, with small calcareous nodules More reddish brown @ 5-6 ftCL- SILTY CLAY: Reddish tan to light reddish brown, loose, occasionally mottled, with occasional gray laminae, grading to CLAYEY SILT (ML) Thick layers of silty clay interbedded with silts @ 7-9 ft. CL- SILTY CLAY: Reddish brown with gray veins, medium stiff to stiff, blocky, waxy, with occasional manganese oxide staining, grading to FAT CLAY (CH). CH- FAT CLAY: Reddish brown, medium stiff, with trace gray veins and manganese oxide staining, grading to SILTY CLAY (CL) in part. CH- FAT CLAY: Gray, medium stiff, with reddish and yellowish brown veinsTransition zone @ 16.5 ftCL- SILTY CLAY: Reddish tan and yellowish brown, occasionally light gray, medium dense, with silt lenses throughout, grading to SANDY SILT (ML) in part. CL- SILTY CLAY: Reddish brown and reddish tan, medium stiff to stiff, jointed, with abundant manganese oxide staining, with gray mottlingThin (~1 inch) CLAYEY SAND (SC) stringer, soft, loose @ 18.5 ftWith gray clay veins @ 19.5-20 ftThin (~1 inch) CLAYEY SAND (SC) stringer, soft to medium stiff, with abundant calcareous nodules, with yellowish brown mottling at depth and increased large calcareous nodules.	
	Shelby Bulk Sample Grab Sample	, H c	alifor	Shear nia			Mud Rota Con	ary tinuou nt Aug sh	s er	Air Rotary Core Barrel Drive Casing	
Logger: Chris	tian M. Uul	II			E	Prilling	j Equi	pmen	it: s	Sonic Rig 128 Contractor: Boart Longyear	

	TE TETR	IATECH		LOG OF BORING B-5		Page 2 of 2
Project Name: F	PC-TX SUPPLEN	MENTAL AOC CH	iARAC	TERIZATION		
Borehole Location:	VCM Area			Surface Elevation: 19		·
ರ್ತಿ ವರ್ಣಗಾಗಿ Number:	B-5		Boreho Diame	ole ter (in.): Date Started: 6/19/2013 Date Fini	shed;	6/19/2013
S I Z	ERY (%)	od) NDEX		WATER LEVEL OBSERVATIONS	Ā	m
DEPTH (ff) OPERATION TYPES SAMPLE STANDARD	<u> </u>	DRY DENSITY (pcf) F LIQUID LIMIT D PLASTICITY INDEX	MINUS NO. 200 (%) GRAPHIC LOG	MATERIAL DESCRIPTION	DEРТН (ft)	WELL DIAGRAM
30 NVS SP	O O O O O O O O O O O O O O O O O O O	AQ III PI	MIN MIN CERT	-CL- SILTY CLAY: Mottled light gray, yellowish brown and light reddish tan, medium stiff to stiff, with manganese oxide staining Increased manganese oxide staining @ 27.5 ft. -CL- SILTY CLAY: Mottled gray, reddish tan and yellowish brown, with abundant manganese oxide staining, iron nodules, and small calcareous nodules. -CL- SILTY CLAY: Reddish brown and gray, very stiff to hard Calcareous lenses @ 31-31.5 ft. Hard @ 34-37 ft. Slickenside @ 37.5 ft Layer of predominately gray @ 37.5-38 ft. Increasing reddish tan mottling @ 40-41 ft Predominately gray clay with reddish brown veins, slightly sandy @ 41-43 ft. CL- SILTY CLAY: Light gray to greenish gray, very stiff, with abundant small calcareous nodules, slickensided, with occasional reddish tan veins.	26 28.5 - 30 - - - 43	
Sampler Spl Types: Spl She San Fin Gre San Logger: Christian M	k California B Sonic	TT Mud	uous Auger	Auger Notes: Air Rotary Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear		

Te	TETRATECH	LOG OF BORING B-6	Page 1 of 2
Project Name: FPC-TX SUF	PPLEMENTAL AOC CHARA	CTERIZATION	1 01 2
Borehole Location: Former E	Brookings Property	Surface Elevation: 16.19	
∂orehole Number: B-6	Bore Dian	hole neter (in.): Date Started: 6/22/2013 Date Finished	t: 6/22/2013
ES	NT (%)	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE SAMPLE G PENETRATION TEST PID (ppm)	SAMPLE RECOVERY (%) MOISTURE CONTENT (%) DRY DENSITY (pcf) T LIQUID LIMIT D PLASTICITY INDEX MINUS NO. 200 (%)		WELL DIAGRAM Casing Top Elev. 18.88 (ft) Casing Type: S.S.
rypes. Zyopour Z	Drilling Equipment:	-CL- SILTY CLAY: Brown to gray brown, very stiff, with abundant roots, small gravel, and iron nodules, dry. Reddish tan @ 2.5-3 ft. CL- SILTY CLAY: Reddish brown and reddish tan, medium stiff to stiff, with occasional light brown mottling, with occasional calcareous material and thin silt lenses, stiffer with depth. Blocky, with occasional gray veins and manganese oxide staining @ 5-7 ft. Slightly moist and grading to FAT CLAY (CH) @ 11-12.5 ft. CL- SILTY CLAY: Light gray and yellowish brown, medium stiff to stiff, with calcareous material. Erosional contact @ 13 ft. CL- SANDY CLAY: Reddish tan to reddish brown, soft, with very fine grained sand, thin laminae with silt and clay interbedding. Silghtly moist, silty @ 13.5 ft. CH- FAT CLAY: Reddish brown, stiff, with occasional oxidation staining, with occasional reddish tan and gray jointing. Manganese oxide staining @ 15-17 ft. Thin sand and silt, moist @ 15.3 ft. CL- SILTY CLAY: Mottled reddish brown, reddish tan and yellowish brown, medium stiff to very stiff, blocky. CL- SILTY CLAY: Mottled reddish brown, reddish tan and yellowish tan mottling, grading to SANDY CLAY (CL). Thin, wet, clayery sand lenses (1 inch thick) @ 19 ft. SANDY CLAY: CL) @ 19.5-22 ft. Light gray and yellowish brown, soft, occasionally very soft, with gray laminae and abundant calcareous nodules @ 22-23 ft. CL- SANDY CLAY: Tan and yellowish brown, soft to very soft, with erosional silt and sand lenses throughout, Notes: Alir Rotary Core Barrel	Cement/ Bentonite grout

	TE TETRA	TECH		LOG OF BORING B-6	Page 2 of 2
Project Name: F	FPC-TX SUPPLEME	ENTAL AOC CH/	ARAC	TERIZATION	Z VI Z
Borehole Location:	Former Brookings	s Property		Surface Elevation: 16.19	
3orehole Number:	B-6		Boreho Diame	ole eter (in.): Date Started: 6/22/2013 Date Finished:	6/22/2013
Solution Types 42 Approximate Number: Approximat	TEST ID AMPLE RECOVERY (%) OISTURE CONTENT (%)	DRY DENSITY (pct) 日本 LIQUID LIMIT 型 PLASTICITY INDEX MINUS NO. 200 (%)	Diame	WATER LEVEL OBSERVATIONS While Drilling	m WELL DIAGRAM 3/8" bentonite chip seal 20/40 silica sand 20/40 silica sand - 3/8" bentonite chip backfill
Sampler Types: Split Spoo	by Vane Shear ple California Sonic	Operation Types: Mud Rotary Continuou Flight Aug Wash Rotary	ger V	Auger Notes: Air Rotary Core Barrel Drive Casing	
Logger: Christian M. L	_lull	Drilling Equipmen	nt: Sc	onic Rig 128 Contractor: Boart Longyear	,

	TE TETRA	ATECH	LOG OF BORING B-7	Page 1 of 2
Project Name:	PC-TX SUPPLEM	IENTAL AOC CHARAC	TERIZATION	<u> </u>
Borehole Location:	VCM Area		Surface Elevation: 19.85	
ವಿorehole Number:	B-7	Borel Diam	ole eter (in.): Date Started: 6/20/2013 Date Finished	: 6/20/2013
, s	RY (%)	X	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G STANDARD		DRY DENSITY (pcf) LIQUID LIMIT PLASTICITY INDEX MINUS NO. 200 (%) GRAPHIC LOG	MATERIAL DESCRIPTION (£)	WELL DIAGRAM Casing Top Elev. 22.62 (ft) Casing Type: S.S.
			-CL- SILTY CLAY: Mottled reddish brown and dark brown,	P
	1.3		medium stiff, with roots. -CL- SILTY CLAY: Dark brown to dark gray, medium stiff, with occasional iron nodules.	Concrete seal and pad
5			-CL- SILTY CLAY: Light gray to dark gray, very stiff to hard, with abundant calcareous nodules, with manganese oxide and oxidation staining. 4.5 -CL- SILTY CLAY: Mottled reddish brown and light gray	
	1.1		and tan, stiff to medium stiff, with abundant calcareous material.	
	1.3		-CL- SILTY CLAY: Reddish brown and gray, medium stiff to stiff, with occasional calcareous material and manganese oxide staining, with gray veins Moist lens @ 8 ft.	
1 0	0.4		- Work for Se Off.	
	0.6		Grading to FAT CLAY (CH) @ 11-13 ft.	
	0.4		Slickensides at 30 degrees and 45 degrees from horizontal @ 13-14 ft.	Cement/ Bentonit grout
15	1.1			
	0.3		Reddish tan and tan silt, loose to medium dense, friable, moist @ 16.2-16.6 ft. -ML- SILT: Light brown to yellowish brown, loose, very fine	
	0.3		grained, grading to CLAYEY SAND (SC). -CL- SILTY CLAY: Reddish brown, medium stiff to stiff,	
20	0.4		with occasional thin silt stringers Blocky, transition zone @ 19-19.5 ft Transitioning to light brown clay with light gray and	
	0.3		reddish brown mottling @ 19.5-21 ft. 21.4 -CL- SILTY CLAY: Light gray, very stiff, with abundant calcareous material, with occasional manganese oxide	
	0.3		staining.	- 3/8"
25	. 🗸	Operation	<u></u>	bentonite chip
Sampler Spi Types: Spi Shi	elby Vane Shear	TTI Mud	Auger Notes: Air Rotary Core Barrel	
Gra Sai	·	Wash Rotary	Drive Casing	
Logger: Christian M		Drilling Equipment:	Sonic Rig 128 Contractor: Boart Longyear	

,	TE TETR	ATECH	LOG OF BORING B-7	Page 2 of 2
Project Name: F	PC-TX SUPPLEM	MENTAL AOC CHARAC	TERIZATION	
Borehole Location:	VCM Area		Surface Elevation: 19.85	
Borehole Number:	B-7	Boreh Diame	oole ster (in.): Date Started: 6/20/2013 Date Finished:	6/20/2013
TYPES	OVERY (%)	(pcf) IT / INDEX 5 (%)	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPE: SAMPLE STANDARD G STANDARD G PENETRATION	E G S X	DRY DENSITY (pcf)	MATERIAL DESCRIPTION (金 世 日本	WELL DIAGRAM
- \ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	0.1		-CL- SANDY CLAY: Light gray, soft to medium stiff, slightly moist, with very fine grained sand throughout, occasionally grading to SANDY FAT CLAY (CH), with some CLAYEY SAND (SC) lenses. SANDY SILT (ML), light gray, loose, friable @ 28-28.5 ft. -CL- SILTY CLAY: Light gray, very stiff, with oxidation staining, occasionally yellowish brown. Slickensides @ 29-29.8 ft and 30 ft. -CH- FAT CLAY: Light gray and yellowish brown, very stiff to hard, with abundant oxidation.	20/40 silica sand
35	0.1 0.2 0.1		-CL- SILTY CLAY: Light gray to yellowish brown, soft to medium stiff, grading to SANDY CLAY (CL) Silt-filled fracture, moist @ 35.3 ft. Silt layer @ 36.7-37 ftML- SILT: Light brown to reddish tan, loose, friable, very fine grained, slightly clayey, wet, grading to SILTY SAND (SM) in part SANDY CLAY (CL) layer, yellowish brown, heavily	0.010" S.S. screen
45	0.2		oxidized @ 37.5-37.8 ft. -SC- CLAYEY SAND: Light gray to light yellowish brown, with occasional reddish tan mottling, loose, very fine grained to fine grained, saturated, grading to SILTY SAND (SM). SANDY CLAY (CL), reddish brown and gray, medium stiff, transition from sand to clay @ 39-39.5 ft. -CL- SILTY CLAY: Light gray to greenish gray, very stiff to hard, with abundant calcareous material and nodules, with occasional yellowish brown mottling, reddish brown along fractures, occasionally medium stiff at depth. Silckensides @ 41.5-42.5 ft. Occasional calcareous material-filled fractures @ 45-47 ft.	20/40 silica sand 3/8" bentonite chip backfill
Sampler Types: Split Spool Shelb Bulk Samp Grab Samp Crab	Vane Shear California Sonic	Operation Types: Continuous Flight Auger Wash Rotary Drilling Equipment: sa	Auger Notes: Air Rotary Core Barrel Drive Casing	

	TE TETRA TECH											LOG OF BORING B-8	Page 1 of 2
Projec	ct Na	ame:	FPC-	TX SU	PPL	EM	ENTA	AL A	oc (CHAF	RACT	ERIZATION	
Borel	ole	Locati	on: V	'CM Ar	ea							Surface Elevation: 18.41	
3oreh	ole	Numb	er: B	-8		,				E	Boreho Diamet	le er (in.): Date Started: 6/19/2013 Date Finished:	6/19/2013
	ENT (%)								DEX	(6		WATER LEVEL OBSERVATIONS While Drilling	m
DЕРТН (ft)	OPERATION TYPES		S STANDARD PENETRATION TEST	PID (mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pof)	F LIQUID LIMIT	☐ PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION (환)	WELL DIAGRAM Casing Top Elev. 20.91 (ft) Casing Type: S.S.
												-CL- SILTY CLAY: Mottled light brown, tan, and gray, soft to medium stiff, with roots.	0 0
			Parameter .	0					•			-CL - SILTY CLAY: Dark gray brown to dark gray soft to	Concrete seal and pad
5				0								-CL- SILTY CLAY: Light brown and tan, medium stiff to stiff, slightly sandy in part, with organic lenses Oxidized @ 5-6 ft.	
_	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			0.3						***************************************		-CL- SILTY CLAY: Light brown and tan, soft to medium stiff, frable, with abundant oxidation staining Slightly sandy @ 7-8.3 ft.	
10			A STATE OF THE PARTY OF THE PAR	0.4						***************************************		-ML- SILT: Light brown, tan, and yellowish brown, medium stiff to stiff, friable, with thin silty sand lenses and sandy clay streaks. Heavily oxidized, yellowish brown @ 10-11 ft.	
				0		***************************************			**************************************	***************************************		Dark orange brown SILTY SAND (SM) @ 11-12 ft.	
-			**************************************	0						***************************************		-SC- CLAYEY SAND: Dark yellowish brown to orange brown, loose to medium dense, very fine grained.	
15			***************************************	0								-SM- SILTY SAND: Light brown to light reddish tan, loose, very fine grained, saturated.	Cement/ Bentonite grout
			and the second s									-SM- SILTY SAND: Light brown to yellowish brown, loose, very fine grained, occasionally medium dense, interbedded FAT CLAY (CH) layer @ 17.1-17.5 ft.	
20				0					-	To the second se		-CL- SILTY CLAY: Light gray, medium stiff to very stiff, with abundant manganese oxide staining and calcareous nodules Transition zone, fat reddish brown clays laminated with	
				0								organic material, gray clay lenses, and oxidized sands @ 18.3-19 ft Uniform, with abundant small calcareous nodules @ 20-23 ft.	
-			***************************************	0								Slickenside @ 23,5 ft.	
Samp Types	oler s:		Split Spoon Shelby Bulk Sample	Ž		omete Shear nia	er T	pera ypes:	Mud Rota	I ary itinuou ht Aug		Auger Notes: Air Rotary Core Barrel	X1 1X1
Logge		®	Grab Sample an M. Llull	∭ s	onic				Was Rota	sh		Orive Casing Contractor: Boart Longyear	

1	TE TETRA	TECH		LOG OF BORING B-8	Page 2 of 2							
Project Name: F	PC-TX SUPPLEME	ENTAL AOC C	HARAC	TERIZATION								
Borehole Location:	VCM Area			Surface Elevation: 18.41								
ರ್ನಾಗಿಂle Number:	B-8		Boreho Diame	ole ter (in.): Date Started: 6/19/2013 Date Finished:	6/19/2013							
89 7	ERY (%)	of) LDEX	(9)	WATER LEVEL OBSERVATIONS While Drilling	m							
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G PENETRATION		DRY DENSITY (pdf) F LIQUID LIMIT TO PLASTICITY INDEX	MINUS NO. 200 (%) GRAPHIC LOG	MATERIAL DESCRIPTION (E)	WELL DIAGRAM							
30	0			Thin laminae, very stiff, with abundant iron nodules, occasionally gray and reddish tan @ 25-27 ft.	- 3/8" bentonite chip seal							
35	0			-CL- SILTY CLAY: Light gray, reddish brown, and yellowish brown, stiff to very stiff, laminated. Increased calcareous material and nodules, very stiff, dry @ 33-34.5 ft. Softer, moist clay @ 34.5-35 ft.	20/40 silica sand							
40	0			-SM- SILTY SAND: Reddish tan and light gray, loose to medium dense, grading to SANDY CLAY (CL), grading to SILT (ML), moist. -CL- SILTY CLAY: Reddish brown with thin gray veins, medium stiff to very stiff, laminated, with manganese oxide staining, increasing gray with depth, transition zone. -CL- SILTY CLAY: Light gray, medium stiff to very stiff, with abundant small calcareous nodules, occasionally off-white.	0.010" S.S. screen							
45	0			-CL- SANDY CLAY: Light gray, medium stiff, with abundant calcareous nodules Interbedded with CLAYEY SAND (SC) @ 40.8-41 ft and 42.2-42.5 ft Increasing oxidation with depth @ 42 ftCH- FAT CLAY: Light gray and yellowish brown, stiff to very stiff, with manganese oxide veins, heavily oxidized Slickensides @ 44 ft and 46.5 ft.	- 3/8" bentonite chip backfill							
Sho Bul San MM, Gra	Bottom of borehole at 47.0 feet.											
Logger: Christian M		Drilling Equip	ment:	Sonic Rig 128 Contractor: Boart Longyear								

Project Name	TETRA TECH										LOG OF BORING D-45	Page 1 of 4		
Someticle Number: Description Descripti	Project Name:	FPC-	TX SU	PPL	EME	ENTA	AL A	000	CHAF	RACT	TERIZATION			
Demander (n): Comment	Borehole Location	on: F	ormer	WW	/TP						Surface Elevation: 15.05			
While Drilling \(\frac{\text{V}}{\text{controlling}} \) While Drilling \(\frac{\text{V}}{\text{V}} \) And the provided of the provided	∂orehole Numbe	er: D	-45						B	oreho lamet	ole ter (in.): Date Started: 6/13/2013 Date Finished: 6/1	13/2013		
CL- SILTY CLAY: Dark brown with occasional reddish tan ulayers, stiff, with notes and organic matter. CL- SILTY CLAY: Motited brown and plack, medium stiff, with roots and organic material, div. CL- SILTY CLAY: Motited brown and black, medium stiff, with horizon and organic material, div. CL- SILTY CLAY: Motited brown and black, medium stiff, with roots and organic material, div. CL- SILTY CLAY: Motited brown and black, medium stiff, with with abundant stand graying to SILTY CLAY (CH), div. CL- SILTY CLAY: Motited brown modium. SIT, with notes and occasional calcamous modules. CL SILTY CLAY: Reddish brown with gray wells, medium stiff, with looss all lenses, grading to SILTY MAIL, div. CL- SILTY CLAY: Reddish brown with gray wells, medium stiff, with work occasional accessors material and managenese code standing, div. - Motel, with gray motiting @ 7-8 ft. - Chemical coder, fractured @ 8-9.5 ft. - CL- SILTY CLAY: Reddish brown with gray wells, medium stiff, with the occasional gray greaters, grading, div. - Chemical coder, fractured @ 8-9.5 ft. - CL- SILTY CLAY: Reddish brown with gray wells, medium stiff, with brown or with gray wells, medium stiff, with coasional gray streaks, grading to CLAYE SILTY (ML) and SILTY (M				RY (%)	ENT (%)	ر ا		DEX			WATER LEVEL OBSERVATIONS While Drilling	1		
All Services All	DEPTH (ft) OPERATION TYPE SAMPLE STANDARD	PENE	PID (ppm)	SAMPLE RECOVE	MOISTURE CONT	DRY DENSITY (pd			MINUS NO. 200 (%	GRAPHIC LOG				
Logger: Christian M. Ltull Drilling Equipment: Sonic Rig 128 Contractor: Boart Longyear	10 15 20 20 Sampler Types:	Split Spoon Shelby Bulk Sample		enetra alifor	omete		Opera	Mucc Rota Folio	lary tinuou nt Aug		CL- SiLTY CLAY: Dark brown with occasional reddish tan layers, stiff, with roots and organic matter. -CL- SiLTY CLAY: Black to dark brown, stiff, with roots and organic material, dry. -CL- SiLTY CLAY: Mottled brown and black, medium stiff, with abundant small gravel/calcareous nodules, dry. -CL- SiLTY CLAY: Reddish brown and brown, medium stiff, with roots and occasional calcareous nodules. -CL- SiLTY CLAY: Reddish brown and brown, medium stiff, with roots and occasional calcareous nodules. -CL- SiLTY CLAY: Reddish brown, medium stiff, with occasional calcareous material and manganese oxide staining, dry. -Moist, with gray mottling @ 7-8 ft. -Chemical odor, fractured @ 8-9.5 ft. -CL- SiLTY CLAY: Reddish brown with occasional gray mottling and veins, soft to medium stiff, with lenses of fat clay, chemical odor. -Siff, jointed @ 11.5 ft. -MI- SANDY SILT: Light brown and yellowish brown, loose, with heavy chloroform odor, with occasional gray streaks, grading to CLAYEY SILT (ML) and SILTY SAND (SM) in part. -Lithified clay zone (1" thick) @ 13.3 ft, becoming light reddish brown below @ 14 ft. -CH- FAT CLAY: Reddish brown to brick red, medium stiff, very plastic, jointed, with manganese oxide streaks, with trace oxidation. -Silf-filled fractures @ 14.6 ft. -Sharp contact @ 18 ft. -CH- FAT CLAY: Gray with reddish tan mottling, stiff to very stiff, with oxidation staining, with occasional calcareous nodules. -Silckensides @ 19.8 ft. -CH- FAT CLAY: Gray and yellowish brown, very stiff, with abundant calcareous material. -Calcareous layer @ 22.3 ft. -CH- SANDY FAT CLAY: Tan and gray, soft to medium Auger Notes: Air Rotary Core Barrel Drive	Concrete		
	Logger: Christia	ın M. Liuli	CHADA	CTEP	IZATIC				•			Omitted 5 to 40 mm ha		

	TE TE	TRATI	ЕСН		10.10		L	OG OF BORING D-45		Page 2 of 4
Project Name: F	PC-TX SUPPL	EMEN	TAL A	OC (CHAF	RACT	TERIZATION	**************************************		
Borehole Location:	Former WW	TP					Surface Elevation:	15.05		
Borehole Number:	D-45				B D	oreho iame	ole ter (in.):	Date Started: 6/13/2013	Date Finished	6/13/2013
80	ERY (%)	ENT (%)		IDEX			V	VATER LEVEL OBSERVATIO m Upon Completion of Di		m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD GPENETRATION	— =	MOISTURE CONTENT (%)	F LIQUID LIMIT	D PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	RIAL DESCRIPTION	DEPTH (ff)	WELL DIAGRAM
36 35 36 38 36 38 36 38 36 38 36 38 36 38 36 38 36 38 36 38 36 36 36 36 36 36 36 36 36 36 36 36 36	t Penetro iby Vane Sh	near	Opera	tion Mud	ary tinuous nt Auge sh		nodules Fracture @ 25 -CH- FAT CLAY reddish tan, soft indules and trace Thin silt/sand indules are displayed Grading to SA CH- FAT CLAY manganese oxide Slickenside @ Fracture plane With silt lense With silt lense CH- FAT CLAY with trace oxidation, grading CLAYEY SAN Yellowish brow SM- SILTY SAN very fine grained, CL- SANDY CL. stiff, with trace ox CLAYEY SILT (M Very soft @ 40 CL- SILTY CLA small calcareous grading to SAND' Several fracture.	Mottled yellowish brown, tan and light to medium stiff, jointed, with calcareous coxidation. Seams @ 27.2 ft, 27.6 ft and 27.9 ft. NDY FAT CLAY (CH), soft @ 28.2 ft. Gray and yellowish brown, stiff, with a carrier of the control of the control of the carrier	30.8 trace 37.8 stiff, 35.4 race 37.8 sto 39.5 um 39.5 um depth,	Cement/ Bentonite grout
Logger: Christian M.	Lluli		Drilling	g Equi	pment	: s	onic Rig 128 Contr	actor: Boart Longyear		

	TETR	RATECH	LOG OF BORING D-45	Page 3 of 4
Project Name: F	PC-TX SUPPLEM	MENTAL AOC CHARA	CTERIZATION	<u>,</u>
Borehole Location:	Former WWTP)	Surface Elevation: 15.05	
ತorehole Number:	D-45	Bore Dian	chole neter (in.): Date Started: 6/13/2013 Date Finished	: 6/13/2013
89 7	ERY (%)	EX	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD OPENETRATION	_ ~ = 1 \ 1 =	DRY DENSITY (pdf) F LIQUID LIMIT PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION DEPTH (ft)	WELL DIAGRAM
			-CH- FAT CLAY: Yellowish brown and gray, very stiff to hard, very plastic, with iron nodules and trace calcareous material.	
55			-CL- SILTY CLAY: Reddish tan to light reddish brown with occasional gray mottling, with abundant manganese and iron oxide nodules and staining, with increasing calcareous material @ depth.	
			-CH- FAT CLAY: Reddish brown, very stiff, with abundant calcareous material and gray blebs.	
30			Grading to SILTY CLAY (CL) @ 59 ft. Sharp contact @ 62 ft.	→ 3/6" bentonite chip seal
-	0.3		-SM- SILTY SAND: Light brown to brown with yellowish brown streaks, loose to medium dense, very fine to fine grained, with very little clay, poorly graded in part, damp.	20/40 silica sand
	0.9		Trace clayey layers (1-2 in. thick) @ 66.5 ft.	
	0.3		-SW- WELL-GRADED SAND: Light brown to brown, loose, very fine grained to medium grained, rounded, with very few fines.	
70	0.9			
	1.7		-SC- CLAYEY SAND: Light brown to yellowish brown, loose, very fine grianed to medium grained, with < 30% fines.	0.010" S.S. soreen
75 Sampler Spl	it Penetrome	1,4000.	-SW- WELL-GRADED SAND WITH GRAVEL: Yellowish Auger Notes:	
She	k nple California	Mud Rotary Continuous Flight Auger Wash Rotary	Air Rotary Core Barrel Drive Casing	
Logger: Christian M	. Lluil	Drilling Equipment:	Sonic Rig 128 Contractor: Boart Longyear	

TE TETRA	тесн	LOG OF BORING D-45	Page 4 of 4
Project Name: FPC-TX SUPPLEME	NTAL AOC CHARAC	TERIZATION	
Borehole Location: Former WWTP		Surface Elevation: 15,05	
∂orehole Number: D-45	Boreh Diame	ole eter (in.): Date Started: 6/13/2013 Date Finished:	6/13/2013
N ERY (%)	of) VDEX %)	WATER LEVEL OBSERVATIONS While Drilling ▼ m Upon Completion of Drilling Remarks:	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD TEST TEST PID (ppm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pd) LIQUID LIMIT D PLASTICITY INDEX MINUS NO. 200 (%) GRAPHIC LOG		WELL DIAGRAM
80		brown and brown, loose, coarse to medium grained, with coarse clay blebs, with dark gray organic zones, with small rounded gravel. -ML- CLAYEY SILT: Light tan, light brown and yellowish brown, loose, occasionally medium dense, with some light gray blebs. - Grading to CLAYEY SAND (SC) @ 76.5-77.5 ft. -CL- SANDY CLAY: Light brown, medium stiff, with oxidation, with some reddish brown to tan blebs. -CH- SANDY FAT CLAY: Mottled gray and reddish tan, very stiff, with oxidized zones and common calcareous material, jointed. Bottom of borehole at 82.0 feet.	20/40 silica sand
Sampler Types: Spoint Spoon Penetrometer Shelby Vane Shear Bulk Sample California Grab Sample Conger: Christian M. Liuli	Operation Types: Mud Rotary Continuous Flight Auger Wash Rotary Drilling Equipment:	Auger Notes: Air Rotary Core Barrel Drive Casing Contractor: Beat Longwar	

				ŧ	ETR	ATEC	СН				LOG OF BORING D-46					age of 4	
Project	Nam	e: FPC	-TX SI	JPP	LEM	ENT.	AL A	00	CHAI	RACT	TERIZATION	And States and Andrews of Andrews of Andrews			<u> </u>		
Borehol	le Lo	cation:	Former	W۷	VTP						Surface Elevation:	18.36					
 ∂orehol	le Nu	mber: [D-46						E	Boreho Diamel	ole ter (in.);	Date Started: 6/15/2013	Date F	inished	l: 6,	/15/2	013
· · · · · · · · · · · · · · · · · · ·	2			RY (%)	ENT (%)	(DEX				VATER LEVEL OBSERVATIO m Upon Completion of D		Ā		m	
DEPTH (ft)	SAMPLE	STANDARD PENETRATION TEST	(mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pdf)	F LIQUID LIMIT	☑ PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATER	RIAL DESCRIPTION		DEPTH (ft)	Casing		AGRAM 5 20.94 (ft) S.
	333										-CL- SILTY CLAY roots, with small to	: Dark brown, medium stiff to stiff, to medium gravel.	vith	1	D	iz.	
	- R S		0		determinant							/: Mottled reddish tan and dark gray,		2		Ż.	- Concrete seal
											-CL- SILTY CLAY	: Dark gray, soft, with trace small g	avel,		D.	V. A.	and pad
											moist.						
5			0								Stiffer with dept very stiff @ 4 ft.	th and dry, occasionally medium stiff	to	5.1			
	}}											f: Brown to gray brown, medium stiff nodules and small gravel.	to	<u>6.1</u>			
			0]			-CL- SILTY CLAY	r: Reddish brown, medium stiff to sti plastic, jointed, with silt lenses.	ff,	<u> </u>			
											Slightly moist @			_			
			0					***************************************						_			
10			0								Grading to SILT	「(ML) @ 9.5 ft.	F. 61	L			
			0									ed SANDY SILT (ML) layer @ 10-10		L '			
	183		ľ								staining, blocky @	reddish brown, with manganese oxid 11 ft.	ie				
			0											_			
-			U								CH EAT CLAV.	Reddish brown, medium stiff to stiff,		14			
15			0								plastic, with calcare	eous veins and manganese oxide st		-1 5.2			
			Ü									LT: Reddish tan, very fine grained. IDY CLAY (CL) @ 15.8 ft.		16.3			
			0								-ML- SANDY SILT	T: Lìght reddish brown to yellowish be ense, with occasional clay blebs, gra		-			
_			Ū								SANDY CLAY (CL)		iding to	-			
-	8		0								SANDY CLAY ((CL) layer @ 18.8-19.3 ft.	_	19.3			
20												D: Light brown to yellowish brown, lo moist, slightly clayey in part.	ose,	-			
-	1833		0								∖ Sharp contact @	D 20.7 ft.		20.7			
	}}	. [_									Reddish brown, soft to medium stiff, c, with manganese oxide staining.		-			
	}}		0											23.5			
-	}}											Reddish tan with gray mottling, stiff asional manganese oxide staining.	o	-			
25 Sample	<u> </u>	☑ Snlit					perat	ion	·		Fracture plane @	@ 23.6 ft.			<u> </u>	<u>K</u>	
Types: Spoon Periodometer Types:						Mud			Auger Notes:								
	[[Shelby Bulk		ane s			11	Rota Con	iry linuou:	s 🌠	Core						
	<u>[</u>	Sample Grab Sample)))] c		r utA			Was		er ⊈ _ 	Barrel Drive						
			W722				<u></u>	Rota		LV	Casing						
Logger:	Ch	ristian M. Llul	l			0	rilling	Equi	pmen	t: s	onic Rig 128 Contrac	ctor: Boart Longyear					

	TE TETRA	A TECH	LOG OF BORING D-46	Page 2 of 4
Project Name: F	PC-TX SUPPLEM	ENTAL AOC CHARAG	CTERIZATION	2 01 4
Borehole Location:	Former WWTP		Surface Elevation: 18.36	
Borehole Number:	D-46	Borel Diam	nole Date Started: 6/15/2013 Date Finished:	6/15/2013
PES	VERY (%)	X	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G STANDARD		DRY DENSITY (pd) LIQUID LIMIT PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION	WELL DIAGRAM
30 30 40 40 Sampler Split Samp W Split Samp W Samp W Grab Samp W Grab Samp W Grab Samp W Grab	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Penetrometer Vane Shear Vane Shear California le Sonic		-CL- SANDY CLAY: Gray, medium stiff, occasionally soft, with abundant calcareous nodules, with trace oxidation and manganese oxide staining. Moist @ 27.8-28.2 ft Increased oxidation @ 28.5 ft Grading to CLAYEY SILT (ML) @ 28.8-29.4 ft and 29.9-30.6 ft. ML- SILT: Light brown with gray streaks, loose, sandy SM- SILTY SAND: Light brown, loose, very fine grained to fine grained, non-cohesive, wet, grading to CLAYEY SAND (SC). CL- SANDY CLAY: Light gray, light brown and light reddish tan, soft to medium stiff, with occasional oxidation, jointed Interbedded with sand lenses @ 37-38 ft Heavily oxidized @ 38-39 ft. SC- CLAYEY SAND: Light brown to yellowish brown, loose to medium dense, oxidized @ depth Grading to SILTY SAND (SM) @ 41 ft. SM- SILTY SAND: Off-white to very light gray, loose to medium dense, very fine grained, interbedded with silts and clays throughout, darker with depth, occasionally grading to SANDY CLAY (CL) and SANDY SILT (ML). SM- SILTY SAND: Light brown to yellowish brown, loose to medium dense, fine grained to very fine grained, uniform, slightly clayey Predominately light brown @ 47-49 ft. Medium stiff clay layer @ 49-49.3 ft Off-white to light gray @ 49.3-49.7 ft. Medium stiff clay layer @ 49-3-49.7 ft. Auger Auger Air Rotary Core Barrel Drive Casing	Cement/Bentonite grout

	TE TETRA	TECH	LOG OF BORING D-46	Page 3 of 4
Project Name: F	PC-TX SUPPLEME	ENTAL AOC CHARAC	CTERIZATION	
Borehole Location:	Former WWTP		Surface Elevation: 18.36	
Borehole Number:	D-46	Borel Diam	nole eter (in.): Date Started: 6/15/2013 Date Finished:	6/15/2013
N RES	ERY (%)	cf) NDEX %)	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD OFFICETRATION		DRY DENSITY (pdf) Taulid Limit Delasticity index Minus no. 200 (%)	MATERIAL DESCRIPTION 문	WELL DIAGRAM
555 - 55 - 70 - 70 - 70 - 75 Sampler Types: Split Sam, Grab	O O O O O O O Vane Shear Depty California		CH- FAT CLAY: Gray with reddish tan mottling, medium stiff to very stiff, with abundant calcareous nodules, with occasional manganese oxide staining.	- 3/8" bentonite chip seal
Logger: Christian M. L		Drilling Equipment: s	Sonic Rig 128 Contractor: Boart Longyear	

	TE TET	RA TECH		LOG OF BORING D-46	Page 4 of 4
Project Name: FF	PC-TX SUPPLE	MENTAL AOC CHAR	RACT	ERIZATION	
Borehole Location:	Former WWTI	Ρ ,		Surface Elevation: 18,36	
∂orehole Number:	D-46	Bc Dia	orehol iamet	le er (in.): Date Started: 6/15/2013 Date Finished:	6/15/2013
SH N	ERY (%)	of) ADEX %)		WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD OFFICE STANDARD FENETRATION	PID (Ppm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pd) F LIQUID LIMIT PLASTICITY INDEX MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
80	0			SANDY CLAY (CL) lenses with small gravel @ 76-76.5 ftSP- POORLY GRADED SAND: Light brown, tan and yellowish brown, loose, very fine grained.	0.010" S.S. screen
	0			-CH- FAT CLAY: Reddish brown, stiff, very plastic, with layers of light brown, loose, very fine grained SILT (ML).	
•					
		·			
Sampler Split Spoon Shelby Bulk Sample Sample	y 🗓 Vane Shear e X California	CCC va	\mathbf{N}	Auger Notes: Air Rotary Core Barrel Drive Casing	
_ogger: Christian M. Llt	ull	Drilling Equipment:	Son	nic Rig 128 Contractor: Boart Longvear	

	TETRA	А ТЕСН	LOG OF BORING D-47	Page 1 of 5
Project Name: F	PC-TX SUPPLEM	ENTAL AOC CHARAG	CTERIZATION	
Borehole Location:	VCM Area		Surface Elevation: 20.41	
ರ್ತಿಂrehole Number:	D-47	Bore Dian	hole Date Started: 6/18/2013 Date Finished:	6/18/2013
N N	ERY (%)	cf) VDEX %)	WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD STANDARD PENETRATION		DRY DENSITY (pcf) LIQUID LIMIT D PLASTICITY INDEX MINUS NO. 200 (%)	MATERIAL DESCRIPTION (E) Handle Graph (1) Handle	WELL DIAGRAM Casing Top Elev. 23.47 (ft) Casing Type: S.S.
			-CL- SILTY CLAY: Dark brown, soft, organic.	PP
10 10 15	0 1.1 2500 105 5.2 52.7 0.7 0.7		1	Concrete seal and pad
20	4 111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Becoming SILTY CLAY (CL) @ 20-22 ft.	
	0.7		-CL- SILTY CLAY: Light brown to light yellowish brown,	
25	0.5		with occasional light reddish tan mottling, medium stiff to stiff, with manganese oxide and calcareous material, occasionally fat in part. -CL- SANDY CLAY: Light brown to light yellowish brown,	
Sampler Types: Spirt Sport Spo	vane Shear ple California ple Sonic	Mud Rotary Continuous Flight Auger Wash Rotary	Auger Notes: Air Rotary Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear	Revised 5-18-12 (FHA)

			(T	F) T	ETR	ATEC	эн				L	OG OF BOI	RING D-47				P 2	age of 5
Project	Nam	e: FP(C-TX SL	JPP!	LEM	ENT	AL A	100 (CHAI	RAC ⁻	TERIZATION							01 0
Boreho	ole Lo	cation:	VCM At	rea							Surface Elevation:	20.41						
doreho	ole Nu	mber:	D-47						E	Boreho Diamet	ole ter (in.):	Date Started:	6/18/2013	Date F	inished	d: 6	/18/2	.013
	/PES	NO		VERY (%)	NTENT (%)	(bct)	L	INDEX		The state of the s	1	_	L OBSERVATIOI pon Completion of Dr		<u>Ā</u>		m	
ОЕРТН (ft)	SAMPLE	STANDARD PENETRATION TEST	Old (bbm)	SAMPLE RECOVERY (%)	MOISTURE CONTENT	DRY DENSITY (pcf)	F LIQUID LIMIT	PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	RIAL DESCR	RIPTION		DEPTH (ft)	WE	:LL DI	IAGRAM
30 30 35 40 45 50 Sample Types:		Split Spicon Spoon Shelby Bulk Sample Grab Sample	0.4 21.4 17.4 20.8 762 0.4 Va	enetro Si aliforn	ometer		perati:	ion Mud Rotar	ary tinuous in Auge		occasional oxidati (GC). -CL- SILTY CLA brown, and light y calcareous nodule -CL- SILTY CLA stiff, with small ca transition zone. -CL- SILTY CLA occasionally medi Brown clay lay -CL- SILTY CLA with small calcare oxide staining. Abundant iron With occasional CH- FAT CLAY: -CL- SILTY CLAY reddish brown, sti -SM- SILTY SAN grained to fine gra CH- FAT CLAY: CL- SILTY CLAY with abundant calculated and staining.	ion staining, gradicy with GRAVEL vellowish brown, ves, with abundant Y: Gray to light gradicareous nodules Y: Reddish brownium stiff, mottled, ers @ 29.5-30.5 Y: Gray to light gradical light reddish term Reddish brown, see with calcareous material and the control of the cont	moist, transition zon ft. ray, medium stiff to s h occasional mangar ft. 6 ft. n mottling @ 36-38.5 stiff. rellowish brown, and is nodules. ght gray, loose, very the gray for the gray.	VEL light taining. very ne. stiff, nese	26 27 - 30.5 - 38.5 39 - 42 - 47 - 49			Cement/ Bentonite grout
Logger:	Chri	istian M. Liuil	1			Dr	rilling	Equip	pment:	.: Sc	onic Rig 128 Contra	ctor: Boart Longy	ear					

		T	E]⊤	ETRA	A TEC	СН				LOG OF BORING D-47		Page 3 of 5
Project Nan	ne: FF	C-TX SU	JPPI	LEMI	ENT	AL A	000	CHAI	RAC	FERIZATION	*	<u> </u>
Borehole Lo	ocation:	VCM A	rea							Surface Elevation: 20.41		
, Borehole No	umber:	D-47	•					E	Boreho Diame	ole ter (in.): Date Started: 6/18/2013 Date I	Finished	i: 6/18/2013
ES	7		ERY (%)	rent (%)	ि		4DEX			WATER LEVEL OBSERVATIONS While Drilling	<u>Ā</u>	m
DEPTH (ff) OPERATION TYPES	STANDARD STANDARD TEST	PID (ppm)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION	DЕРТН (ft)	WELL DIAGRAM
	}}		ļ							and manganese oxide staining.	1	
	}	0.6			**************************************					Slickensides @ 51.5 ft.		
		0.8								Heavily fractured zone @ 53-57 ft.		
55		33.4								Slickensides @ 54.5 ft, 56.5 ft, and 59.3 ft.		
		0										
		0.8								·		
30		1.1								Increased calcareous material @ 60 ft.	-	
		0.5	The state of the s		The state of the s					Becoming silty, with reddish tan mottling @ 61 ft. -CL- SILTY CLAY: Light gray to yellowish brown, medium stiff to stiff, with trace manganese oxide staining and nodules, with reddish tan mottling, with slickensides at 6-inch spacing. Highly faulted @ 61.5-66.5 ft.	61	
		0								Softer and sandier, with predominant reddish tan and gray clay @ 67-68 ftCL- SILTY CLAY: Reddish brown, medium stiff, micaceous.	68	
70		3.4								-CL- SANDY CLAY: Reddish brown to reddish tan, soft, with very fine grained sand throughout, grading to CLAYEY SAND (SC).	70.5	
75		ere i constituente de la constit								-CL- SILTY CLAY: Reddish brown, soft to medium stiff, with SANDY CLAY (CL) layers Soft, moist @ 73.5-74.5 ft.	72,5	
Sampler Types:	Split Spoor Shelb Bulk Samp Grab Samp	y	ane S		T	peratypes:	Mud Rota Conf Fligh Was Rota	iry linuou: it Auge ih	er 📗	Auger Notes: Air Rotary Core Barrel Drive Casing Contractor: Boart Longyear		

	(Tr	TETRA	ATEC	н				L	OG OF BOI	RING D-47		Page 4 of 5
Project Name: F	PC-TX SU	PPLEM	ENTA	\L A	000	CHAF	RACT	TERIZATION	•			······································
Borehole Location:	VCM Ar	ea						Surface Elevation:	20.41			
Borehole Number:	D-47					B	oreho	ole ier (in.):	Date Started:	6/18/2013	Date Finishe	d: 6/18/2013
S E E	The second secon	ERY (%) TENT (%)	ef)		VDEX	%)		1		L OBSERVATION OON Completion of Dr		m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD GPENETRATION		SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	프 PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	RIAL DESCF	RIPTION	DEPTH (ft)	WELL DIAGRAM
	0 0							CI CUTYCEA	V. Doddiek beer	atte vill A		
80	8.3							manganese oxide with gray clay veil	staining, with tra	n, very stiff, with trac ice calcareous nodul ft.		
	217		***************************************					Very stiff @ 82	2-84 ft.		 	
35	13,3								ium stiff, grading	light reddish brown, to SANDY CLAY (C		~ 3/8" bentonite chip seat
90	0.1							-SC- CLAYEY S. grained, with occa		ht brown, loose, very s.	88 / fine	20/40 silica sand
	10.9							-SM- SILTY SAN very fine to fine g		o yellowish brown, lo	ose,	
95	0.8			***************************************				Becoming SAN	IDY CLAY (CL) @	o. O. 95-96 ft.	-	
	0.5			-	Trial Villandia					Yellowish brown to ligation of the little		0.010" S.S. screen
100	0.8							SANDY CLAY	(CL) layer, yellow	vish brown and gray	@ 100	
Sampler Spl Spc She	eliby Vennple Conple Score	enetromete ane Shear alifornia onic	TOTAL PROPERTY AND	perat /pes:	Mud Rota Cont Fligh Was Rota	inuous It Auge In		Auger Notes Air Rotary Core Barrel Drive Casing Onic Rig 128 Contra	s:			

	(T	ات [ع	ETR/	ATEC	Н				LOG OF BORING D-47	Page 5 of 5
Project Name:	PC-TX SU	JPPL	.EMI	ENT	AL A	oc (CHA	RAC	ERIZATION	- 4
Borehole Location:	VCM A	rea							Surface Elevation: 20.41	
∂orehole Number:	D-47						Į.	Boreho Diame	ple (in.): Date Started: 6/18/2013 Date Finished:	6/18/2013
ES		ERY (%)	ENT (%)	£		IDEX			WATER LEVEL OBSERVATIONS While Drilling	m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD OPENETRATION		SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	LIQUID LIMIT	PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION (E)	WELL DIAGRAM
- W SF	1.1 0.9 3.5 8.3				E.L.	PI	-		\	Native slough
									Bottom of borehole at 107.0 feet.	

Notes:

Auger

Split Spoon

Sampler Types:

Operation Types:

Penetrometer

	TETR/	ATECH		L	OG OF BORING P-61		Page 1 of 1
Project Name:	PC-TX SUPPLEM	ENTAL AOC (CHARAC	TERIZATION	V7 . RA_00 L	•	
Borehole Location:	Former Brooking	gs Property		Surface Elevation:	17.6		
∂orehole Number:	P-61		Borel Diam	nole eter (in.):	Date Started: 6/22/2013	Date Finished	: 6/22/2013
8	ERY (%) ENT (%)	if)		V	VATER LEVEL OBSERVATIO 7 m Upon Completion of Di		m
DEPTH (ft) OPERATION TYPES SAMPLE STANDARD G) STANDARD	TEST ID ppm) AMPLE	DRY DENSITY (pcf) F LIQUID LIMIT D PLASTICITY INDEX	MINUS NO. 200 (%) GRAPHIC LOG	MATE	ERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM Casing Top Elev. 20.31 (fl) Casing Type: S.S.
10 Sampler Types: Sp	it Penetromete vane Shear k California	ar Operation Types: Mud Rota 冒蒙 Con	ary tinuous at Auger sh	-CL- SILTY CLA stiff, with occasion Abundant calc -CL- SILTY CLA gray, very stiff, withroughout. -CL- SILTY CLA calcareous material calcareous	nted calcareous zone @ 13.8-14.5 ft. AY: Reddish tan to light brown, soft, virg and trace wood detritus. ND: Light brown, loose, non-cohesive, a trace yellowish brown streaks, saturally: Reddish brown with reddish tan striff, with abundant manganese oxide salcareous material. ad @ 19-19.5 ft. act, heavily cemented calcareous zone. AY: Light gray, medium stiff to very stifnall calcareous nodules, with occasion ks and lenses. ace, increased reddish tan streaks @ ottom of borehole at 22.0 feet.	2 nal 3.8 , with 1.7 1.7 12.3 with 16 very ted. 17 eaks, taining, 20.2 f, 20.2	Casing Type: S.S. P
Logger: Christian M	LIUII	Drilling Equi			actor: Boart Longyear	<u></u>	

	TE TETRA	А ТЕСН	N. 4	LOG OF BORING P-62	Page 1 of 1
Project Name: F	PC-TX SUPPLEM	ENTAL AOC	CHARAC	TERIZATION	
Borehole Location:	Former Brooking	gs Property		Surface Elevation: 18.83	
Borehole Number:	P-62		Borel Diam	nole eter (in.): Date Started: 6/21/2013 Date Finished:	6/21/2013
DN PES	/ERY (%)	oof)	A TANAN AND A STANLAR AND A ST	WATER LEVEL OBSERVATIONS While Drilling m Upon Completion of Drilling Remarks:	m
DEPTH (#) OPERATION TYPES SAMPLE STANDARD G STANDARD		DRY DENSITY (pdf) FLIQUID LIMIT PLASTICITY INDEX	MINUS NO. 200 (%)	MATERIAL DESCRIPTION	WELL DIAGRAM Casing Top Elex. 21.66 (ft) Casing Topus: S. 9.
10 SPT	q (q)	a LL PI		-CL- SILTY CLAY: Dark brown to black, medium stiff to stiff, with roots and organic matter. -CL- SILTY CLAY: Light brown and tan, medium stiff to stiff, with abundant calcareous material. -CL- SILTY CLAY: Reddish brown, medium stiff, with occasional gray mottling, with occasional thin silt stringers, with occasional calcareous material. -Yellowish brown clay layer @ 7.5-8 ft. -Reddish tan @ 8-9 ft. -SILT (ML) @ 10-11 ft. -Softer @ 11-12 ft. -CL- SILTY CLAY: Reddish brown to reddish tan, medium stiff, with occasional gray mottling, blocky, with occasional manganese oxide staining. -Sandy clay stringers (1/4 inch thick) @ 12.8 ft, 14 ft, and 15.2 ft. -SM- SILTY SAND: Reddish tan, loose, very fine grained, moist to saturated, grading to SANDY CLAY (CL). -More clayey, grading to CLAYEY SAND (SC) @ 17-17.5 ft. -CL- SILTY CLAY: Reddish brown, medium stiff, with gray mottling, with abundant manganese oxide staining, jointed, waxy.	Casing Top Elev. 21.66 (ft) Casing Type: S.S. P. Concrete Seal and pad 3/8" bentonite chip seal 20/40 silica sand 0.010" S.S. screen
-		1		-CL- SILTY CLAY: Yellow brown to reddish tan, very stiff to hard, with occasional gray veins, with abundant calcareous material.	
11.03%		II	1	Mottled with gray @ 20.3-21 ft Thin shell fragment layer, cafcareous cemented, slightly moist @ 20.3-21 ft. Bottom of borehole at 22.0 feet.	<u></u>
Sampler Types: Spil Spc She She She Sam	lby Vane Shear Apple California b Sonic	Muc	ary [/ Itinuous ht Auger [] sh ary	Auger Notes: Air Rotary Core Barrel Drive Casing Sonic Rig 128 Contractor: Boart Longyear	

				F	ETR	4 TEC	СН				Le	OG OF BORING P-63				P:	age of 2
Projec	t Nam	ie: FP0	C-TX SL	JPPI	LEM	ENT	AL A	.00	CHAI	RAC	TERIZATION						
Boreh	ole Lo	cation:	Former	W۷	VTP						Surface Elevation:	22.06					
Joreh	ole Nu	ımber:	P-63						E	Boreho Diame	ole ter (in.):	Date Started: 6/17/2013	Date F	inished	: 6/	17/2	013
	S			ERY (%)	ENT (%)	E		DEX			1	VATER LEVEL OBSERVATIO 'm Upon Completion of Di		Ā		m	
DEРТН (ft)	OPERATION TYPES	STANDARD PENETRATION TEST	(mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	T PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATE	RIAL DESCRIPTION		DEPTH (ft)	Casing '		AGRAM : 25,31 (ft) S.
	*										-CL- SILTY CLA` and organic mate	Y: Dark brown, medium stiff, with roo rial, grading to SILT (ML).	ts	1	Z	P	
		}	0								with calcareous n		stiff,	2.2	D	N. V.	 Concrete seal and pad
											occasional manga dry.	Y: Reddish brown, very stiff, with anese oxide staining, with calcareous		3.8	D. O.	, d	ани рац
5			1.1								-CL- SILTY CLA' medium stiff, joint	Y: Reddish brown with gray veins, so ted, slightly moist.	ft to	_			
-			1				***************************************		**************************************					_			
10			0.7	***************************************							Calcareous @	8-10 ft.					- 3/8" bentonite chip seal
1											-CL- SANDY CL/	AY: Soft, moist, with calcareous nodu	iles.	<u></u> 10.2 11			sear
			0.4								occasional gray m	Reddish brown, medium stiff, with nottling, with abundant manganese ox to SILTY CLAY (CL).	ide	_			
			0,2									CLAY (CL) zone @ 12.8-13.3 ft.	······ , <u>-</u> _	13.8			
15			0								occasionally reddi	AY: Reddish brown, soft to medium s sh tan, grading to CLAYEY SAND (S AND: Reddish brown to reddish tan, l	<u>C).</u> _/	14.5 15.5			
_			0								with clayey layers,			10.5			- 20/40 silica sand
											mottling and veins	s, medium stiff to stiff, with manganes casionally calcareous, with silt lenses.	e	17.8			
			0								\ Clayey sand ler \- SM - SILTY SAN	ns, slightly moist @ 17.3-17.5 ft. D: Light brown to yellowish brown, lo	ose [18.8			0.010"
20			0								CH- FAT CLAY:	very fine grained, grading to SILT (N Reddish brown to reddish tan, mediu aanganese oxide staining, grading to s	m [20			S.S. screen
	¥ }};										stiff, occasionally y	f: Light brown with gray mottling, med yellowish tan, with oxidation staining. ce, SANDY CLAY (CL), soft, with land ad calcareous nodules @ 21.2-21.7 fi	ge /	22			20/40 silica sand
25											-CL- SILTY CLAY	f: Light gray and yellowish brown, me t oxidation staining, with trace manga	dium r	24			
Sample Types:	er	Split Spoon	Ø P¢	enetro	omete	T O	perat				Auger Notes	:					
I		Shelby	لصي	ane S				Mud Rota	гу		Air Rotary						
		Bulk Sample Mr Grab		aliforr	nia			Fligh Was	inuous It Auge In	er L	Core Barrel Drive						
	[Grab Sample	, [[] s	onic				Rota		LV	Casing						
Logger	: Ch	ristian M. Llu	H			D	rilling	Equi	omen	t: s	onic Rig 128 Contra	ctor: Boart Longyear					

			ाः	TE	TRA	TEC	сн				LOG OF BORING P-63		Page 2 of 2
Proje	ct Nam	e: FP	C-TX SUI	PPLI	EME	NT	AL A	OC C	HAI	RAC	ERIZATION		
Boreh	nole Lo	cation:	Former \	WW.	TP						urface Elevation: 22.06		
Boreh	ole Nu	mber:	P-63						E	Boreho	Pr (in.): Date Started: 6/17/2013 Date Fit	nished:	6/17/2013
(ft)	OPERATION TYPES SAMPLE	STANDARD PENETRATION TEST		SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	LIQUID LIMIT	PLASTICITY INDEX	MINUS NO. 200 (%)	· · · · · · · · · · · · · · · · · · ·	WATER LEVEL OBSERVATIONS	<u>Ā</u>	m
DEPTH (ft)	OPERATI	STAN TEST	O PID (mpdm)	SAMPLE	MOISTU	DRY DE	F	□ PLAS	MINUS	GRAPHIC LOG	oxide staining, occasionally soft, grading to SANDY CLAY (CL).	DЕРТН (ft)	WELL DIAGRAM
	6 53										-CH- SANDY FAT CLAY: Light gray, soft to medium stiff, with small to medium calcareous nodules, grading to SANDY	27	backfill
											CLAY (CL). Bottom of borehole at 27.0 feet.		
Sampler Types:		Split Spoon Shelby Bulk Sample Grab Sample	152 1641		İ	l yp		n Mud Continu Flight Ai Wash Rotary	ous		uger Nofes: ir Rotary ore arrel rive asing		

Project Name: FPC-TX SUPPLEMENTAL AOC CH.												LOG OF BORING P-64	Pa 1 o	ge of 1
Projec	ct N	ame	: FPC	-TX SU	JPPI	LEM	ENT	AL A	OC (CHAF	RAC	FERIZATION		· <u>·</u>
Boreh	ole	Loc	ation:	VCM A	rea							Surface Elevation: 19.68		
Boreh	ole	Nun	nber: I	64							oreho lame	ole ter (in.): Date Started: 6/17/2013 Date Finished:	6/17/20	13
	ES		7		ERY (%)	ENT (%)	સ	need a financial control of the cont	IDEX	(9)		WATER LEVEL OBSERVATIONS While Drilling	m	
DEPTH (ff)	OPERATION TYPES	SAMPLE	STANDARD G PENETRATION TEST	Old (mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	T LIQUID LIMIT	☐ PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	HE I	WELL DIA asing Top Elev. 2 asing Type: S.S.	
												-CL- SILTY CLAY: Light brown to brown, medium stiff, with roots, with organic matter.		
				0								-CL- SILTY CLAY: Dark brown, with occasional dark yellowish brown streaks, medium stiff to soft, with oxidation.		Concrete seal
5				·					:			-CL- SILTY CLAY: Light brown and tan, stiff to very stiff, with abundant oxidation, slightly sandy, mottled with brick red oxidation.	.(.(and pad
				0								-CL- SANDY CLAY: Light brown, stiff, mottled with brick red oxidation, with occasional gray lenses, heavily oxidized, grading to SILTY CLAY (CL).		
_												Lighter with depth @ 8 ft.		3/8" bentonite chip
10				0										seal
				0								-ML- SILT: Light brown and tan, loose, friable.		
				0								Very stiff 6-inch layer @ 13 ft Grading to SILTY SAND (SM), loose, very fine grained, occasionally fine grained @ 13-15 ft.		20/40
15		}}}		0								-SM- SILTY SAND: Light brown to orange brown, loose,		silica sand
		}}} }}}		0								very fine grained to fine grained, slightly clayey, with clay \[\left(\text{lenses throughout.}\right) \] -SC- CLAYEY SAND: Light brown and tan, occasionally		
		***	W-5-2-2-2	0				•				dark brown, loose, very fine to fine grained, moist, grading to SANDY CLAY (CL).		0.010" S.S. screen
20				0										
_				0		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						-SM- SILTY SAND: Light brown to yellowish brown, loose, very fine grained to fine grained, micaceous, with gray lenses, non-plastic, slightly moist.	- 3	3/8"
0.5				0					1			-CL- SILTY CLAY: Reddish brown to reddish tan with gray mottling, grading to FAT CLAY (CH), dry. -CL- SILTY CLAY: Light brown and tan, medium stiff to soft, with abundant calcareous material and large nodules.		bentonite chip backfill
Sampl Types:	er L	774	Split Spoon	— □	enetro	l omete	기	perat	ion			Auger Bottom of borehole at 25.0 feet. Notes:		
rypes:	•	<u>V</u>	Shelby		ne S		: ا		Mud Rota	ΓV		Air Rotary		
			Bulk Sample	Ca	aliforr	nia				iy inuous t Auge	r 🗂	Core Barrel		
			Grab Sample	so	onic				Wasl Rota	h	∇	Drive Casing		
Logge	r:	Chris	tian M. Llull				D	rilling	Equip	oment	So	onic Rig 128 Contractor: Boart Longyear	···· <u>·</u>	

	TE TETRAT	ГЕСН	LOG OF BORING P-65	Page 1 of 1				
Project Name: F	PC-TX SUPPLEMEN	NTAL AOC CHARAC	TERIZATION					
Borehole Location:	VCM Area		Surface Elevation: 20.48					
dorehole Number:	P-65	Boreh Diame	ole eter (in.): Date Started: 6/17/2013 Date Finished:	6/17/2013				
ω	RY (%)	ă l	WATER LEVEL OBSERVATIONS While Drilling	m				
DEPTH (ff) OPERATION TYPES SAMPLE STANDARD Grant ST	PID (ppm) SAMPLE RECOVERY (%) MOISTURE CONTENT (%)	DRY DENSITY (pdf) F LIQUID LIMIT B PLASTICITY INDEX MINUS NO. 200 (%) GRAPHIC LOG	MATERIAL DESCRIPTION (£)	WELL DIAGRAM Casing Top Elev. 23 (ft) Casing Type: S.S.				
10	O O O O O O O O O O O O O O O Variety Penetrometer Vane Shear	Operation Types: Mud Rotary Mud Rotary	-ML- SILT: Light brown, loose, with roots, dry Brown @ 0.8-1.5 ft. -CL- SILTY CLAY: Yellowish brown and light gray, stiff to very stiff, with abundant oxidation Hard @ 2-2.5 ft. -CL- SILTY CLAY: Reddish brown, very stiff to hard, with calcareous material and silt lenses throughout Moist and softer @ 4-6.5 ft. -CL- SANDY CLAY: Reddish brown, stiff to very stiff, with occasional gray mottling and veins, with trace manganese oxide staining and calcareous nodules. -CL- SANDY CLAY: Reddish brown, stiff to very stiff, jointed, with trace gray mottling and calcareous material, grading to FAT CLAY (CH). -SAND (SC) in part, moist, micaceous, with very fine grained sand Saturated @ 14 ft. -CL- SILTY CLAY: Reddish brown, medium stiff to very stiff, jointed, with trace gray mottling and calcareous material, grading to FAT CLAY (CH). -SC- CLAYEY SAND: Reddish tan, loose, very fine grained, with lenses of sandy clay interbedded, grading to SANDY SILT (ML)CL- SANDY CLAY: Reddish brown fat clay lenses, and reddish tan clayey sand layers CLAYEY SAND (SC) layer @ 20.2-20.5 ft CL- SILTY CLAY: Reddish brown, stiff, with manganese oxide veins and calcareous zones. CL- SILTY CLAY: Light brown and yellowish brown, medium stiff to stiff, with trace calcareous material and trace manganese oxide staining. Auger Soltom of borehole at 25.0 feet. Auger Soltom of borehole at 25.0 feet.	Casing Type: S.S. Concrete seal and pad - 3/8" bentonite chip seal - 20/40 silica sand - 20/40 silica sand				
Bul Sar MM Gra Sar		California Flight Auger Barrel						
Logger: Christian M	. LIUII	Drilling Equipment:	Sonic Rig 128 Contractor: Boart Longyear					

TE TETRA TECH										LOG OF BORING P-66	Page 1 of 1	
Project Na	ame: FP	C-TX SL	JPPI	_EMI	ENT	AL A	.00	CHAI	RAC	TERIZATION		
Borehole	Location:	VCM A	rea							Surface Elevation: 19.65		
∂orehole	Number:	P-66							Boreho Diame	ole ter (in.): Date Started: 6/20/2013 Date Finished:	6/20/2013	
S			RY (%)	ENT (%)	e e		DEX			WATER LEVEL OBSERVATIONS While Drilling	m	
DEPTH (ft) OPERATION TYPES	SAMPLE STANDARD PENETRATION TEST	CiP Cipm()	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pdf)			MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION 金	WELL DIAGRAM Casing Top Elev. 22.2 (ft) Casing Type: S.S.	
	}									-CL- SILTY CLAY: Mottled brown, reddish brown, and light brown, soft to medium stiff, with roots.	<i>D D</i>	
_										-CL- SILTY CLAY: Dark brown to black, soft, with roots and	Concrete seal and pad	
										-CL- SILTY CLAY: Brown to light brown, medium stiff, with abundant calcareous material and nodules.	and pad	
5										-CL- SILTY CLAY: Reddish brown and gray, medium stiff to stiff, with occasional calcareous material, slightly plastic.		
10										Occasionally reddish tan @ 9-11 ft.	- 3/8" bentonite chip seal	
										-CH- FAT CLAY: Reddish brown, soft to medium stiff, with abundant manganese oxide staining Stickensides @ 11-13 ft Thin SANDY CLAY (CL) lenses (1 inch thick) @ 11.5 ft, 12.3 ft, and 13.2 ft.		
15										-CL- SANDY CLAY: Reddish brown to reddish tan, soft, slightly moist to damp.		
2										-CL- SILTY CLAY: Reddish brown to reddish tan, medium stiff, with abundant manganese oxide staining, with occasional thin silt lenses.	20/40 silica sand	
										-SC- CLAYEY SAND: Reddish tan and yellowish brown 18.5 with gray mottling.		
20										mottling, stiff, with occasional sandy clay/clayey sand stringers Vertical sand stringer @ 18.5-19.3 ft Occasional yellowish brown mottling @ 19-20 ft.	0.010" S.S. screen	
Sampler Types:	Split Spoor Shelb Samp m Grab	y		omete hear nia	r O	pperat	Mud Rota	ary tinuou at Aug	S s s s s s s s s s s s s s s s s s s s	-CL- SILTY CLAY: Reddish brown to reddish tan with gray mottling, stiff, with occasional sandy clay/clayey sand stringers Vertical sand stringer @ 18.5-19.3 ft Occasional yellowish brown mottling @ 19-20 ft.	·	

			T	E] ^T	ETR	A TE	ĊН				LOG OF BORING P-68 Page	
Projec	t Nan	ie: FP	C-TX SL	JPP	LEM	ENT	AL A	OC	CHAF	RAC	TERIZATION	
Boreh	ole Lo	cation:	Former	W۷	VTP						Surface Elevation: 19.64	
Boreh	ole Nu	ımber:	P-68				,		B	oreho iame	ole eter (in.): Date Started: 6/14/2013 Date Finished: 6/14/2013	3
	TYPES	NO	T. T	VERY (%)	NTENT (%)	(bct)		INDEX	T T T T T T T T T T T T T T T T T T T		WATER LEVEL OBSERVATIONS While Drilling ☑ m Upon Completion of Drilling ☑ m Remarks:	
DEPTH (ft)	SAMPLE	STANDARD G PENETRATION TEST	PID (mdd)	SAMPLE RECOVERY (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	F LIQUID LIMIT	T PLASTICITY INDEX	MINUS NO. 200 (%)	GRAPHIC LOG	MATERIAL DESCRIPTION WELL DIAGI Casing Top Elev. 22.5. Casing Type: S.S.	
5 5 10 15 20		Split Spoon Shelby Bulk Sample	Var	netror ne Sh		Ту	eratic ces:	On Mud Rotario	uous Auger		-CL- SILTY CLAY: Dark brown to gray brown, medium stiff, with roots. -OH- ORGANIC CLAY: Very dark gray to black, soft to medium stiff, stiffer with depth, becomes FAT CLAY (CH) @ 2.3 ft. -CH- FAT CLAY: Dark gray, stiff to very stiff, very plastic, with occasional calcareous nodules. -Reddish brown jointing @ 3.8-4.2 ft. -CL- SILTY CLAY: Reddish tan to reddish brown, soft to medium stiff, with occasional calcareous nodules, damp @ 4.4 ft. -Grading to SILT (ML) @ 5.5-6.2 ft. -CL- SILTY CLAY: Reddish brown to reddish tan with gray mottling, medium stiff to stiff, jointed, with occasional manganese oxide staining.	ncrete al dipad tonite
Grab Sample Sonic Logger: Christian M. Lluil						 	lling E	Inic Rig 128 Contractor: Boart Longwear	_			